

ThinkServer RS110 Types 6435, 6436, 6437, and 6438



# Installation Guide



ThinkServer RS110 Types 6435, 6436, 6437, and 6438



# Installation Guide

**Note:** Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 61 and the *Warranty and Support Information* document on the Lenovo *ThinkServer Documentation* DVD.

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## Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 **Safety Information** (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφαλείας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.

Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

**Important:**

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled “Statement 1,” translations for that caution statement are in the *Safety Information* document under “Statement 1.”

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the server or optional device before you install the device.



Statement 1:



**DANGER**

**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.**

**To Connect:**

1. Turn everything OFF.
2. First, attach all cables to devices.
3. Attach signal cables to connectors.
4. Attach power cords to outlet.
5. Turn device ON.

**To Disconnect:**

1. Turn everything OFF.
2. First, remove power cords from outlet.
3. Remove signal cables from connectors.
4. Remove all cables from devices.

**Statement 2:**



**CAUTION:**

When replacing the lithium battery, use only the battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

*Do not:*

- **Throw or immerse into water**
- **Heat to more than 100°C (212°F)**
- **Repair or disassemble**

**Dispose of the battery as required by local ordinances or regulations.**

**Statement 3:**



**CAUTION:**

When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.
- Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.



**DANGER**

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.



Class 1 Laser Product  
Laser Klasse 1  
Laser Klass 1  
Luokan 1 Laserlaite  
Appareil À Laser de Classe 1

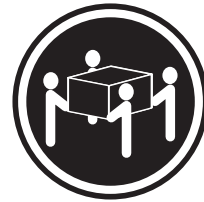
**Statement 4:**



≥ 18 kg (39.7 lb)



≥ 32 kg (70.5 lb)



≥ 55 kg (121.2 lb)

**CAUTION:**

**Use safe practices when lifting.**

**Statement 5:**



**CAUTION:**

The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



**Statement 8:**



**CAUTION:**

Never remove the cover on a power supply or any part that has the following label attached.



Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

**Statement 26:**



**CAUTION:**

Do not place any object on top of rack-mounted devices.



This server is suitable for use on an IT power-distribution system whose maximum phase-to-phase voltage is 240 V under any distribution fault condition.



# Chapter 1. Introduction

This *Installation Guide* contains instructions for setting up your Lenovo® ThinkServer™ RS110 Types 6435, 6436, 6437, and 6438 server and basic instructions for installing some optional devices. More detailed instructions for installing optional devices are in the *User Guide* on the Lenovo *ThinkServer Documentation* DVD, which comes with the server. This document contains information about:

- Setting up and cabling the server
- Starting and configuring the server
- Installing some optional devices
- Solving problems

If firmware and documentation updates are available, you can download them from the Lenovo Web site. The server might have features that are not described in the documentation that comes with the server, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the server documentation. To check for updates, complete the following steps:

**Note:** Changes are made periodically to the Lenovo Support Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers** from the **Select your product** list.
3. Select **Servers** from the **Brand** list.
4. From **Family** list, select **ThinkServer RS110**, and click **Continue**.

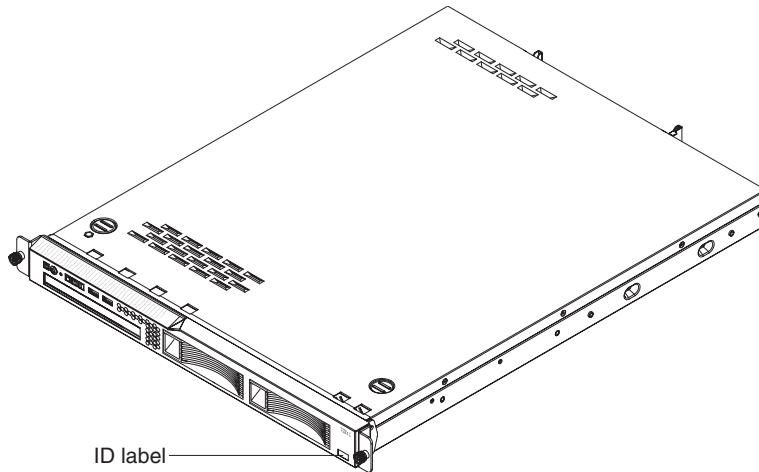
The server comes with an *EasyStartup* DVD to help you configure the hardware, install device drivers, and install the operating system.

The server comes with a limited warranty. You can obtain up-to-date information about the server and other Lenovor products at <http://www.lenovo.com/thinkserver>.

Record information about the server in the following table. You will need this information when you register the server with Lenovo.

<b>Product name</b>	ThinkServer RS110
<b>Machine type</b>	ThinkServer RS110, Types 6435, 6436, 6437 and 6438
<b>Model number</b>	_____
<b>Serial number</b>	_____
<b>Key serial number</b>	_____
<b>Key manufacturer</b>	_____
<b>Key phone number</b>	_____

The model number and serial number are on the ID label on the bezel, as shown in the following illustration.



**Note:** This illustration shows a serial-attached SCSI (SAS) hot-swap hard disk drive model (3.5-inch drives). A Serial ATA (SATA) hot-swap hard disk drive model (3.5-inch drives), SATA simple-swap hard disk drive model (3.5-inch drives), and a SAS hot-swap model with 2.5-inch hard disk drives are also available. This illustration might differ slightly from your hardware.

For a list of supported optional devices for the server, see <http://www.lenovo.com/accessories>.

See the *Rack Installation Instructions* document for complete rack installation and removal instructions.

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## The Lenovo *ThinkServer Documentation* DVD

The Lenovo *ThinkServer Documentation* DVD contains documentation for the server in Portable Document Format (PDF).

### Hardware and software requirements

The Lenovo *ThinkServer Documentation* DVD requires the following minimum hardware and software:

- Microsoft® Windows® XP, Windows 2000, or Red Hat Linux
- 100 MHz microprocessor
- 32 MB of RAM
- Adobe® Acrobat® Reader 3.0 (or later) or xpdf, which comes with Linux operating systems

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## Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the Lenovo *ThinkServer Documentation* DVD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.



- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

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## Features and specifications

The following information is a summary of the features and specifications of the server. Depending on the server model, some features might not be available, or some specifications might not apply.

Racks are marked in vertical increments of 4.45 cm (1.75 inches). Each increment is referred to as a unit, or “U.” A 1-U-high device is 1.75 inches tall.

Table 1. Features and specifications

<p><b>Microprocessor:</b> One Intel® LGA 775 single core, dual core, or quad core, depending on the server model:</p> <ul style="list-style-type: none"> <li>• Single core: Celeron 440 or later</li> <li>• Dual core: Core 2 Duo E4600 or Xeon E3110, or later</li> <li>• Quad core: Xeon 3300 series</li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Use the Configuration/Setup Utility program to determine the size of the L2 cache, type and speed of the microprocessor, and speed of the front-side bus.</li> <li>2. Intel Virtualization Technology (VT) is not available on the Celeron 440 or the Core 2 Duo E4600; however, these microprocessors can run paravirtualization.</li> </ol> <p><b>Memory:</b></p> <ul style="list-style-type: none"> <li>• Minimum: Two 512 MB DIMMs</li> <li>• Maximum: 8 GB</li> <li>• Type: PC2-5300, 667 MHz, ECC, DDR II unbuffered SDRAM DIMMs</li> <li>• Slots: Four dual inline</li> <li>• Supports 512 MB, 1 GB, and 2 GB DIMMs</li> </ul> <p><b>Drives:</b> Ultrabay Enhanced: CD or CD/DVD</p> <p><b>Expansion bays:</b> One of the following configurations:</p> <ul style="list-style-type: none"> <li>• Two 3.5-inch slim-high bays for hard disk drives. <ul style="list-style-type: none"> <li>– Hot-swap models: Supports maximum of two serial-attached SCSI (SAS) drives or two serial ATA (SATA) drives.</li> <li>– Simple-swap models: Supports maximum of two SATA drives</li> </ul> </li> <li>• Four 2.5-inch small form-factor (SFF) hot-swap bays for hard disk drives. Supports a maximum of four 2.5-inch SAS drives.</li> </ul>	<p><b>Expansion slots:</b> Two PCI Express x8 slots, one low-profile and one 3/4-length full height. Low-profile slot supports x4 electrical.</p> <p><b>Video controller:</b></p> <ul style="list-style-type: none"> <li>• ATI ES1000 video on system board</li> <li>• 16 MB DDR II video memory</li> </ul> <p><b>Power supply:</b> 351 watt (110 or 220 V ac auto-sensing)</p> <p><b>Size:</b></p> <ul style="list-style-type: none"> <li>• Height: 43 mm (1.75 inches, 1 U)</li> <li>• Depth: 559 mm (22 inches)</li> <li>• Width: 440 mm (17.32 inches)</li> <li>• Maximum weight: 12.7 kg (28 lb) depending on your configuration</li> </ul> <p><b>Integrated functions:</b></p> <ul style="list-style-type: none"> <li>• Two Broadcom NetXtreme™ GB Ethernet controllers on the system board with Wake on LAN® support</li> <li>• Serial port</li> <li>• Four USB ports (two on front and two on rear of server)</li> <li>• Systems-management port if an optional Remote Supervisor Adapter II SlimLine is installed</li> </ul> <p><b>Hard disk controllers:</b></p> <ul style="list-style-type: none"> <li>• Serial ATA (SATA) controller (simple-swap SATA models)</li> <li>• Serial-attached SCSI (SAS) controller with integrated RAID (hot-swap SAS/SATA models) that supports RAID levels 0, 1, 1E</li> </ul> <p><b>Environment:</b></p> <ul style="list-style-type: none"> <li>• Air temperature: <ul style="list-style-type: none"> <li>– Server on: 10° to 35°C (50.0° to 95.0°F); altitude: 0 to 914.4 m (3000 ft)</li> <li>– Server on: 10° to 32°C (50.0° to 89.6°F); altitude: 914.4 m (3000 ft) to 2133.6 m (7000 ft)</li> <li>– Server off: 10° to 43°C (50.0° to 109.4°F); maximum altitude: 2133.6 m (7000 ft)</li> <li>– Shipping: -40° to 60°C (-40° to 140°F); maximum altitude: 2133.6 m (7000 ft)</li> </ul> </li> <li>• Humidity: <ul style="list-style-type: none"> <li>– Server on: 8% to 80%</li> <li>– Server off: 8% to 80%</li> </ul> </li> </ul>	<p><b>Acoustical noise emissions:</b></p> <ul style="list-style-type: none"> <li>• Sound power, idling: 6.5 bel maximum</li> <li>• Sound power, operating: 6.5 bel maximum</li> </ul> <p><b>Heat output:</b> Approximate heat output in British thermal units (Btu) per hour:</p> <ul style="list-style-type: none"> <li>• Minimum configuration: 341 Btu per hour (100 watts)</li> <li>• Maximum configuration: 1024 Btu per hour (300 watts)</li> </ul> <p><b>Electrical input:</b></p> <ul style="list-style-type: none"> <li>• Sine-wave input (50 - 60 Hz) required</li> <li>• Input voltage low range: <ul style="list-style-type: none"> <li>– Minimum: 100 V ac</li> <li>– Maximum: 127 V ac</li> </ul> </li> <li>• Input voltage high range: <ul style="list-style-type: none"> <li>– Minimum: 200 V ac</li> <li>– Maximum: 240 V ac</li> </ul> </li> <li>• Approximate input kilovolt-amperes (kVA): <ul style="list-style-type: none"> <li>– Minimum: 0.102 kVA</li> <li>– Maximum: 0.55 kVA</li> </ul> </li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. Power consumption and heat output vary depending on the number and type of optional features that are installed and the power-management optional features that are in use.</li> <li>2. These levels were measured in controlled acoustical environments according to the procedures that are specified by the American National Standards Institute (ANSI) S12.10 and ISO 7779 and are reported in accordance with ISO 9296. Actual sound-pressure levels in a given location might exceed the average stated values because of room reflections and other nearby noise sources. The declared sound-power levels indicate an upper limit, below which a large number of computers will operate.</li> <li>3. There is no keyboard connector or mouse connector on the server. You can connect a USB keyboard and USB mouse to the server by using the USB connectors.</li> </ol>
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## Major components of the server

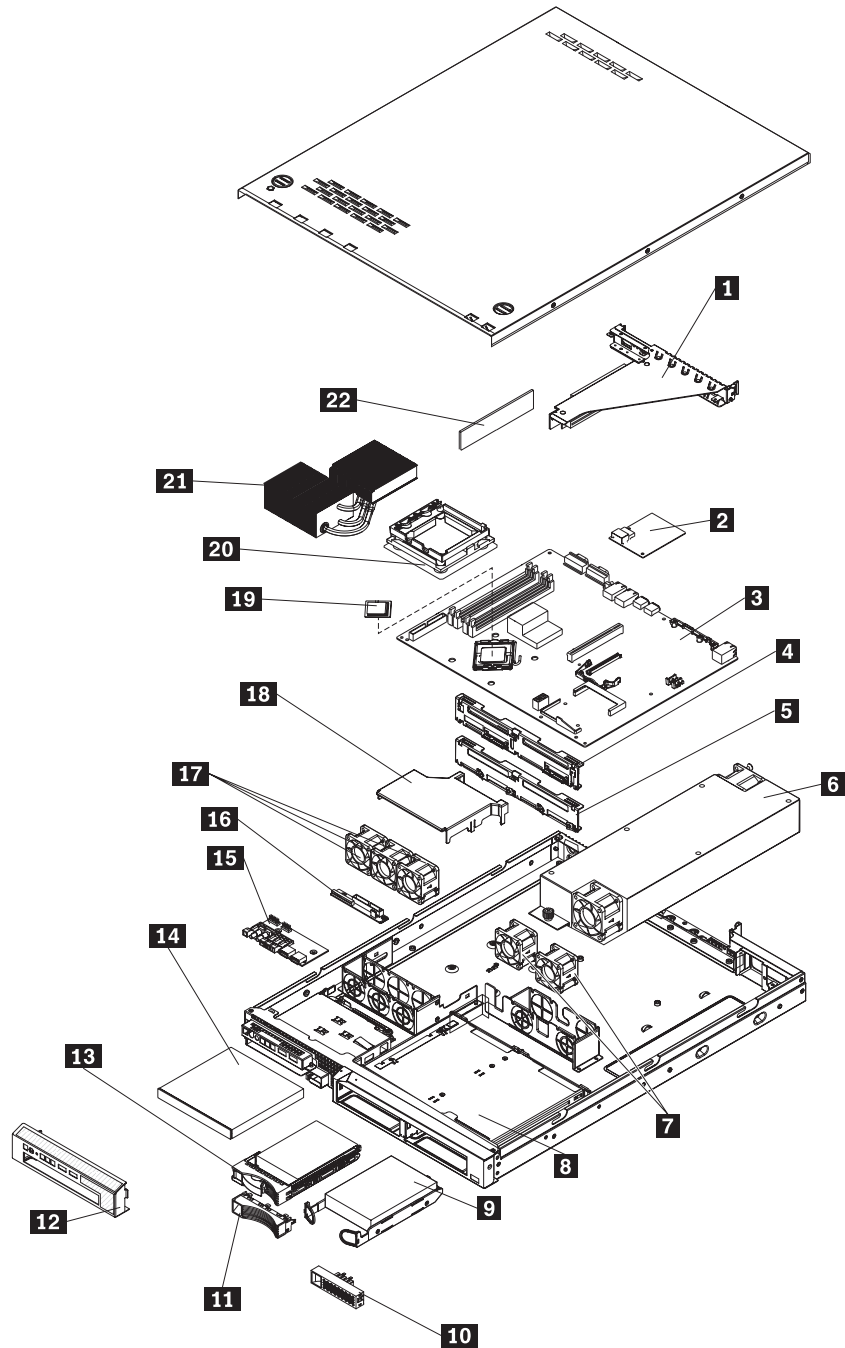
Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.

Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.

The following illustration shows the major components in the server.

**Note:** The illustrations in this document might differ slightly from your hardware.

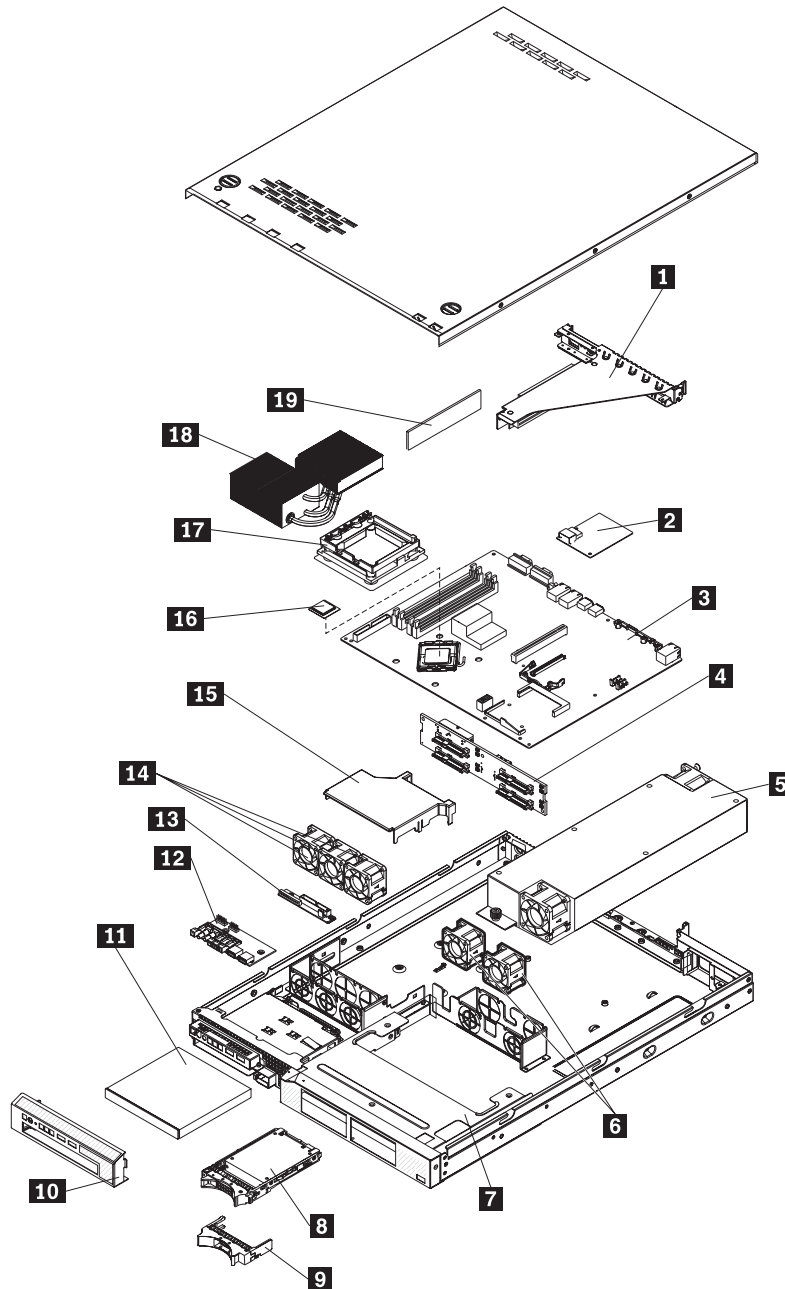
## 3.5-inch models



- |          |   |           |   |
|----------|---|-----------|---|
| <b>1</b> | Riser card assembly                       | <b>12</b> | Bezel   |
| <b>2</b> | SAS/SATA controller (some models)         | <b>13</b> | 3.5-inch hot-swap hard disk drive (some models) |
| <b>3</b> | System board                              | <b>14</b> | CD/DVD drive                                    |
| <b>4</b> | SAS/SATA backplane (some models)          | <b>15</b> | Operator information panel assembly             |
| <b>5</b> | SATA simple-swap back panel (some models) | <b>16</b> | CD/DVD interface card                           |
| <b>6</b> | Power supply                              | <b>17</b> | Fans  |
| <b>7</b> | Fans                                      | <b>18</b> | Air baffle                                      |
| <b>8</b> | 3.5-inch drive cage                       | <b>19</b> | Microprocessor                                  |

- |           |   |           |                                 |
|-----------|---|-----------|---------------------------------|
| <b>9</b>  | 3.5-inch simple-swap SATA hard disk drive (some models) | <b>20</b> | Heat-exchanger retention module |
| <b>10</b> | Simple-swap SATA filler panel                           | <b>21</b> | Heat exchanger assembly         |
| <b>11</b> | Hot-swap hard disk drive filler                         | <b>22</b> | DIMM                            |

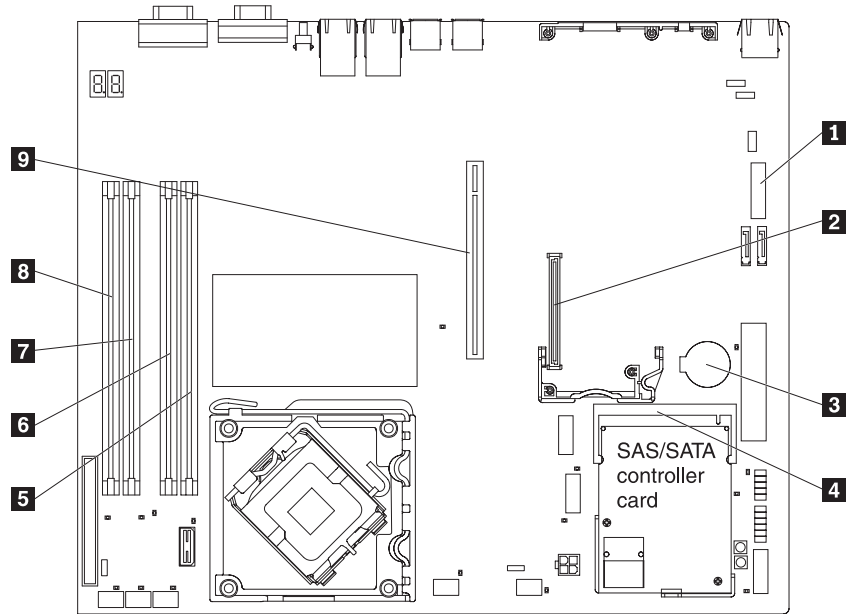
## 2.5-inch models



- |           |                                    |           |   |
|-----------|------------------------------------|-----------|---|
| <b>1</b>  | Riser card assembly                | <b>11</b> | CD/DVD drive                                    |
| <b>2</b>  | SAS/SATA controller (some models)  | <b>12</b> | 3.5-inch hot-swap hard disk drive (some models) |
| <b>3</b>  | System board                       | <b>13</b> | Operator information panel assembly             |
| <b>4</b>  | 2.5-inch hard disk drive backplane | <b>14</b> | Fans  |
| <b>5</b>  | Power supply                       | <b>15</b> | Air baffle                                      |
| <b>6</b>  | Fans                               | <b>16</b> | Microprocessor                                  |
| <b>7</b>  | 2.5-inch drive cage                | <b>17</b> | Heat-exchanger retention module                 |
| <b>8</b>  | 2.5-inch drive hard disk drive     | <b>18</b> | Heat-exchanger assembly                         |
| <b>9</b>  | 2.5-inch filler panel              | <b>19</b> | DIMM  |
| <b>10</b> | Bezel                              |           |   |

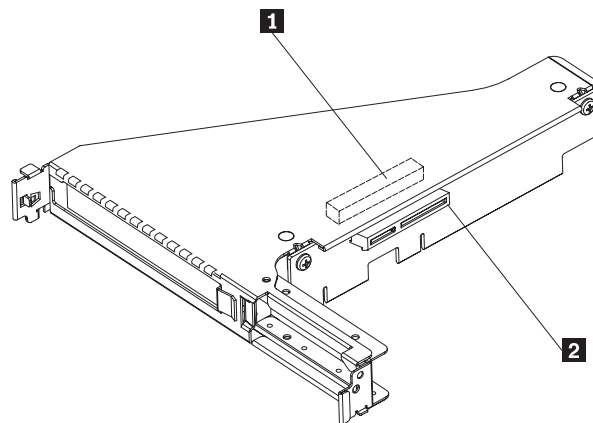
## System-board optional-device connectors

The following illustration shows the connectors for user-installable optional devices.



- |          |   |          |                      |
|----------|---|----------|----------------------|
| <b>1</b> | Other systems-management connector              | <b>6</b> | DIMM 3 connector     |
| <b>2</b> | Remote Supervisor Adapter II SlimLine connector | <b>7</b> | DIMM 2 connector     |
| <b>3</b> | Battery connector                               | <b>8</b> | DIMM 1 connector     |
| <b>4</b> | SAS/SATA controller connector                   | <b>9</b> | Riser card connector |
| <b>5</b> | DIMM 4 connector                                |          |                      |

The following illustration shows the locations of the PCI Express slots on the riser-card assembly.



- |          |                       |
|----------|-----------------------|
| <b>1</b> | PCI Express x8 slot 1 |
| <b>2</b> | PCI Express x8 slot 2 |





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## Chapter 2. Installing optional devices

This chapter provides basic instructions for installing optional hardware devices in the server. These instructions are intended for users who are experienced with setting up Lenovo server hardware.

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### Installation guidelines

Before you install optional devices, read the following information:

- Read the safety information that begins on page v and the guidelines in “Handling static-sensitive devices” on page 13. This information will help you work safely.
- When you install your new server, take the opportunity to download and apply the most recent firmware updates. This step will help to ensure that any known issues are addressed and that your server is ready to function at maximum levels of performance. To download firmware updates for your server, complete the following steps:

**Note:** Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: <http://www.lenovo.com/support>.
  2. Enter your product number (machine type and model number) or select **Servers** from the **Select your product** list.
  3. Select **Servers** from the **Brand** list.
  4. From **Family** list, select **ThinkServer RS110**, and click **Continue**.
  5. Click **Downloads and drivers** to download firmware updates.
- Before you install optional hardware, make sure that the server is working correctly. Start the server, and make sure that the operating system starts, if an operating system is installed, or that a I9990305 error code is displayed, indicating that an operating system was not found but the server is otherwise working correctly. If the server is not working correctly, see Chapter 5, “Solving problems,” on page 37 for diagnostic information.
  - Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
  - If you must start the server while the cover is removed, make sure that no one is near the server and that no tools or other objects have been left inside the server.
  - Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
    - Make sure that you can stand safely without slipping.
    - Distribute the weight of the object equally between your feet.
    - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
    - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
  - Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
  - Back up all important data before you make changes to disk drives.
  - Have a small flat-blade screwdriver available.

- You do not have to turn off the server to install or replace hot-swap fans, redundant hot-swap ac power supplies, or hot-plug Universal Serial Bus (USB) devices. However, you must turn off the server before performing any steps that involve removing or installing adapter cables or non-hot-swap optional devices or components.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the server, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component indicates that the component can be hot-swapped, which means that if the server and operating system support hot-swap capability, you can remove or install the component while the server is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the server, see <http://www.lenovo.com/accessories>.

## System reliability guidelines

To help ensure proper cooling and system reliability, make sure that the following requirements are met:

- Each of the drive bays has a drive or a filler panel and electromagnetic compatibility (EMC) shield installed in it.
- If the server has redundant power, each of the power-supply bays has a power supply installed in it.
- There is adequate space around the server to allow the server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place objects in front of the fans. For proper cooling and airflow, replace the server cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the server cover removed might damage server components.
- You have followed the cabling instructions that come with optional adapters.
- You have replaced a failed fan within 48 hours.
- You have replaced a hot-swap drive within 2 minutes of removal.
- You do not operate the server without the air baffles installed. Operating the server without the air baffles might cause the microprocessors to overheat.

## Working inside the server with the power on

**Attention:** Static electricity that is released to internal server components when the server is powered-on might cause the server to halt, which could result in the loss of data. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.

You might be instructed to turn on the server while the cover is off, to look at system-board LEDs. Follow these guidelines when you work inside a server that is turned on:

- Avoid wearing loose-fitting clothing on your forearms. Button long-sleeved shirts before you work inside the server; do not wear cuff links while you are working inside the server.
- Do not allow your necktie or scarf to hang inside the server.

- Remove jewelry, such as bracelets, necklaces, rings, and loose-fitting wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, that might fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

## Handling static-sensitive devices

**Attention:** Static electricity can damage the server and other electronic devices. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of damage from electrostatic discharge, observe the following precautions:

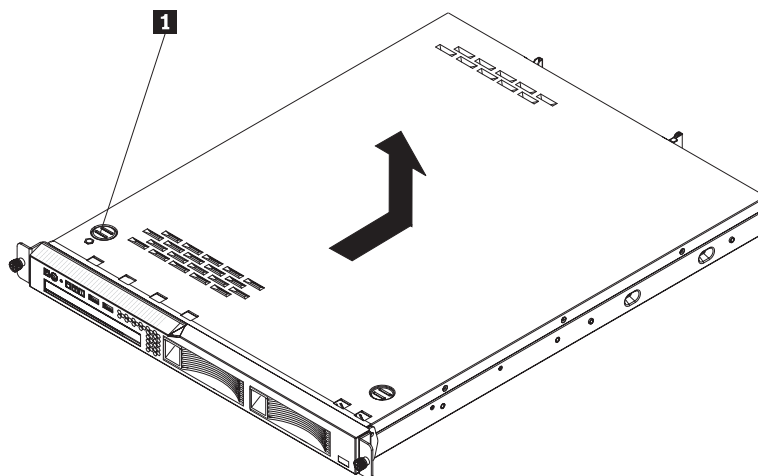
- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the server without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the server cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

---

## Removing the cover

To remove the cover, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 11.
2. Turn off the server and all attached devices.
3. Disconnect all external cables and power cords.



4. Press the cover-release button **1**.
5. Slide the cover back approximately 1.27 cm (0.5 inches); then, lift it off the server.

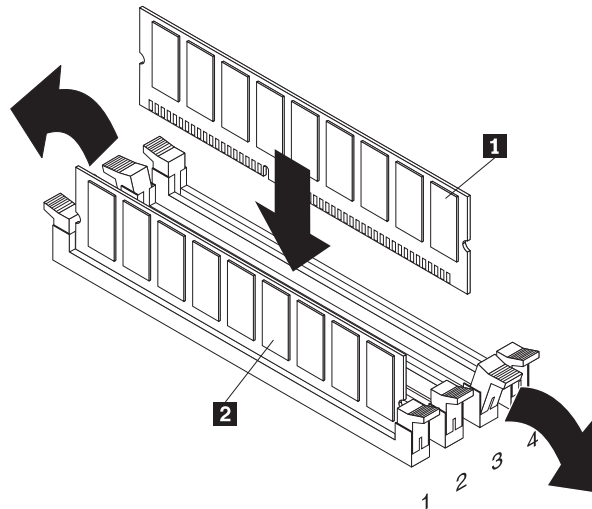
**Attention:** For proper cooling and airflow, replace the cover before you turn on the server. Operating the server for extended periods of time (more than 30 minutes) with the cover removed might damage server components.

---

## Installing a memory module

The following notes describe the types of dual inline memory modules (DIMMs) that the server supports and other information that you must consider when installing DIMMs:

- The server supports 512 MB, 1 GB, and 2 GB DIMMs, for a maximum of 8 GB of system memory. See <http://www.lenovo.com/accessories> for a list of memory modules that you can use with the server.
- The amount of usable memory will be reduced depending on the system configuration. A certain amount of memory must be reserved for system resources. Use the system summary in the Configuration/Setup Utility program to view the total amount of installed memory and the amount of configured memory (see “Using the Configuration/Setup Utility program” on page 34).
- The server comes with one 512 MB or 1 GB DIMM installed in DIMM connector 1 and an identical DIMM (the same size, speed, type, and technology) installed in DIMM connector 3.
- If you install a pair of DIMMs in DIMM connectors 2 and 4, the size, speed, type, and technology of the DIMMs that you install in DIMM connectors 2 and 4 must match each other. However, they do not have to be the same size, speed, type, and technology as the DIMMs that are installed in DIMM connectors 1 and 3.
- You can use compatible DIMMs from various manufacturers in the same pair.
- Install only double-data-rate II (DDR II), PC2-5300, unbuffered synchronous dynamic random-access memory (SDRAM) with error correcting code (ECC) DIMMs. These DIMMs must be compatible with the latest PC2-5300 SDRAM unbuffered DIMM specification.
- If you install a pair of 2 GB DIMMs and a pair of other-size DIMMs, the 2 GB DIMMs must be installed as the first pair (in DIMM connectors 1 and 3).
- When you restart the server after you add or remove a DIMM, a message is displayed indicating that the memory configuration has changed.



To install a DIMM **1** or **2**, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 11.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables. Remove the cover.

**Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, open, and close the clips gently.

3. Open the retaining clip on each end of the DIMM connector.
4. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server. Then, remove the DIMM from the package.
5. Turn the DIMM so that the keys align correctly with the slot.
6. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at each end of the DIMM connector. Firmly press the DIMM straight down into the connector by applying pressure on both ends of the DIMM simultaneously. The retaining clips snap into the locked position when the DIMM is firmly seated in the connector. If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

If you have other devices to install, do so now. Otherwise, go to “Completing the installation” on page 24.

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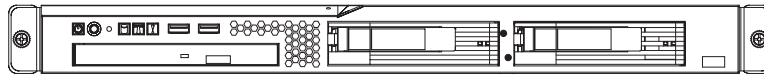
## Installing a hard disk drive

Locate the documentation that comes with the hard disk drive and follow those instructions in addition to the instructions in this chapter.

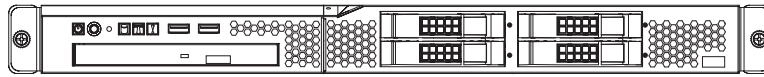
**Note:** The ID for an installed hard disk drive is on the front of the server, next to the bay that contains the drive.

Table 2. Locations of hard disk drive IDs

### 3.5-inch drive model servers



### 2.5-inch drive model servers



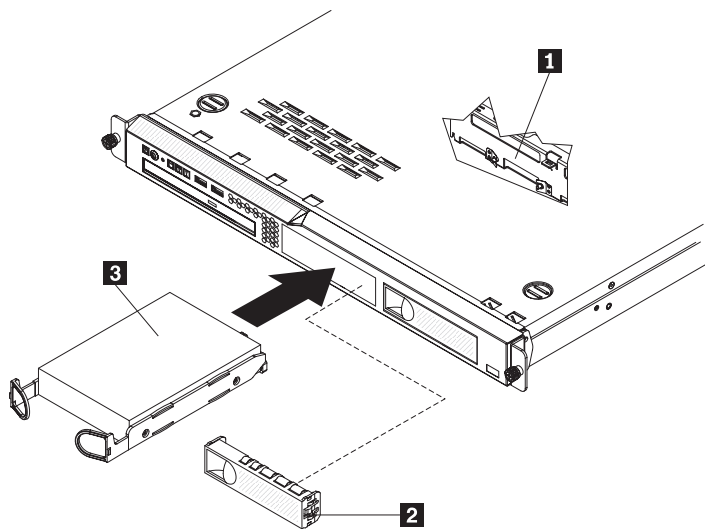
**Attention:** To avoid damage to the hard disk drive connectors, make sure that the cover is in place and fully closed whenever you install or remove a hard disk drive.

## Installing a simple-swap Serial ATA hard disk drive

**Attention:** Simple-swap hard disk drives are not hot-swappable. Disconnect all power from the server before you remove or install a simple-swap hard disk drive.

To install a simple-swap Serial ATA hard disk drive, complete the following steps.

**Note:** If you have only one hard disk drive, install it in the left drive bay.



- |          |                                 |          |                          |
|----------|---------------------------------|----------|--------------------------|
| <b>1</b> | SATA hard disk drive back plate | <b>3</b> | Hard disk drive assembly |
| <b>2</b> | Filler panel                    |          |                          |

**Attention:** To avoid damage to the hard disk drive connectors, make sure that the cover is in place and fully closed whenever you install or remove a hard disk drive.

1. Read the safety information that begins on page v and “Installation guidelines” on page 11.
2. Make sure that the server cover is in place and fully closed.
3. Turn off the server and peripheral devices, and disconnect the power cord and all external cables.
4. Remove the filler panel from the bay.
5. Pull the loops of the tray toward each other and slide the drive into the server until the drive connects to the back panel.

6. Insert the filler panel into the bay to cover the drive.

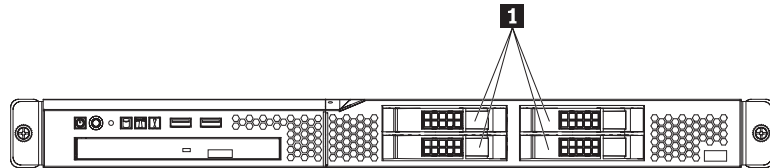
**Notes:**

1. If a RAID controller or adapter is installed, you might have to reconfigure the disk arrays after you install hard disk drives. See your RAID controller or adapter documentation.
2. To remove a simple-swap SATA drive from the bay, make sure that the server is turned off and the power cord is removed; then, remove the filler panel, pull the loops of the drive tray toward each other and pull the tray out of the bay.

If you have other devices to install, do so now. Otherwise, go to “Completing the installation” on page 24.

## Installing a hot-swap hard disk drive

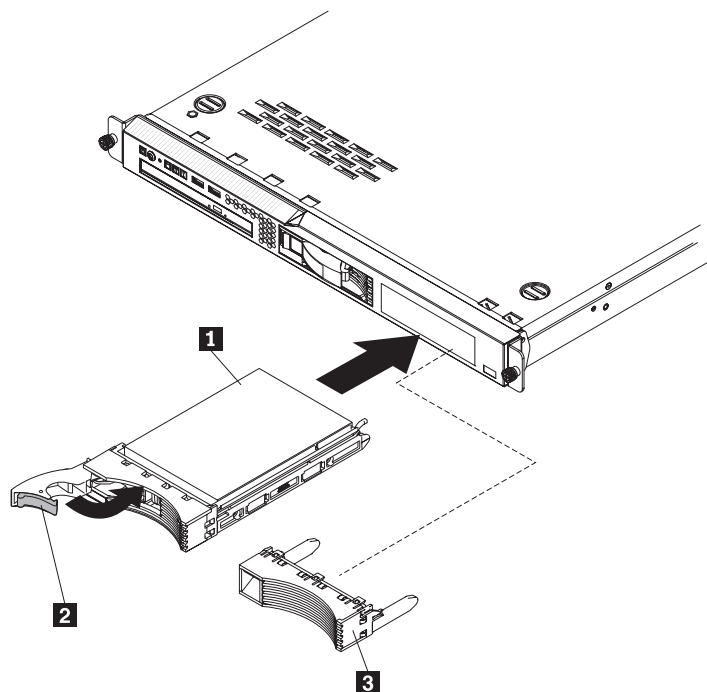
The 3.5-inch drive hot-swap server models support either two SAS 3.5-inch hard disk drives or two SATA 3.5-inch hard disk drives. The 2.5-inch drive hot-swap server models support four 2.5-inch SAS hard disk drives.



The installation procedure is the same for any of these drives. The illustrations in this procedure show 3.5-inch SAS drives.

To install a hot-swap hard disk drive, complete the following steps.

**Note:** If you have only one hard disk drive, install it in the left or upper-left drive bay.



**Attention:** To avoid damage to the hard disk drive connectors, make sure that the cover is in place and fully closed whenever you install or remove a hard disk drive.

1. Read the safety information that begins on page v and “Installation guidelines” on page 11.
2. Make sure that the server cover is in place and fully closed.
3. Remove the filler panel **3** from the bay. Store it in a safe place for possible future use.

**Attention:** To maintain proper system cooling, do not operate the server for more than 10 minutes without either a drive or filler panel installed in each bay.

4. Open the drive tray handle **2**.
5. Gently push the drive assembly **1** into the bay until the drive stops.
6. Close the drive tray handle.
7. Check the hard disk drive status LED to make sure that the hard disk drive is operating correctly. If the amber hard disk drive status LED for a drive is lit continuously, that drive is faulty and must be replaced. If the green hard disk drive activity LED is flashing, the drive is being accessed.

If you have other devices to install, do so now. Otherwise, go to “Completing the installation” on page 24.

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## Installing an adapter

The following notes describe the types of adapters that the server supports and other information that you must consider when you install an adapter:

- Locate the documentation that comes with the adapter and follow those instructions in addition to the instructions in this section. If you have to change switch settings or jumper settings on the adapter, follow the instructions that come with the adapter.
- The adapter slots are on the riser-card assembly. You must first remove the riser-card assembly to access the adapter slots.
- The two PCI Express slots on the riser-card assembly support PCI Express x8 1.0a adapters.
- You can install one full-height three-quarter-length adapter in expansion slot 1 and one low-profile half-length adapter in expansion slot 2.

**Note:** When the optional Remote Supervisor Adapter II SlimLine is installed in the server, you can install only a half-length adapter in expansion slot 1.

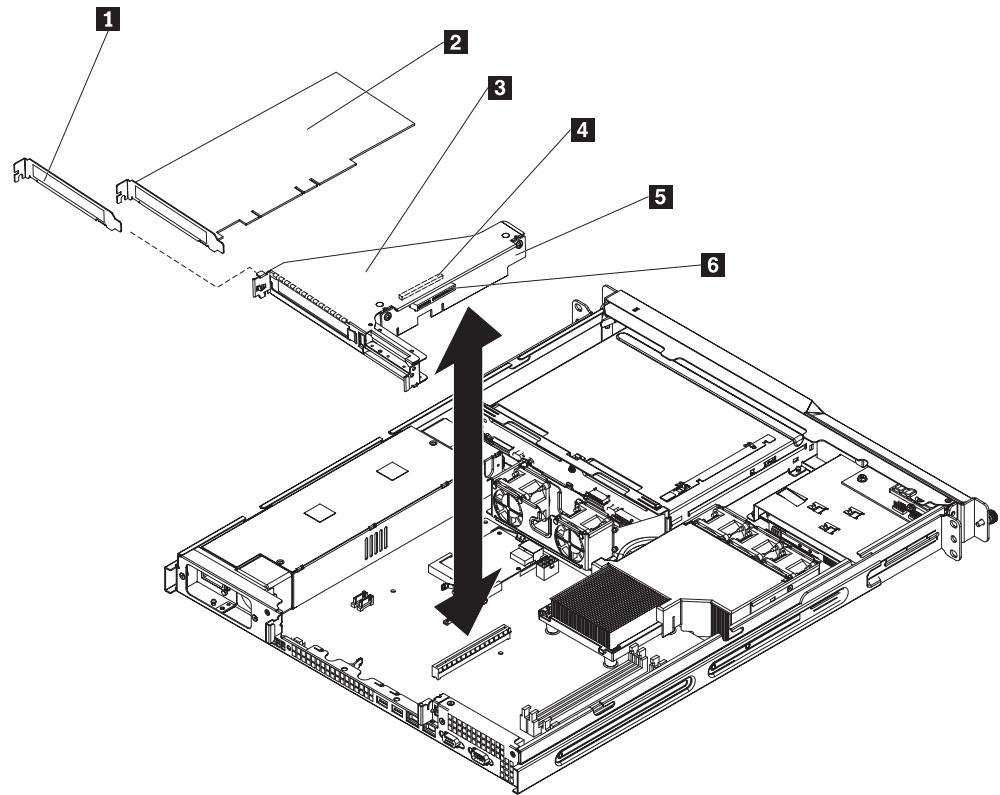
- If you have installed an optional PCI-X riser-card assembly in the server, you can install a full-height, three-quarter-length PCI-X 64/133 MHz adapter in the PCI-X slot on the riser-card assembly.

**Note:** When the optional Remote Supervisor Adapter II SlimLine is installed in the server, you can install only a half-length adapter in the PCI-X slot.

- The optional Remote Supervisor Adapter II SlimLine can be installed only in the dedicated connector on the system board (see “System-board optional-device connectors” on page 9 for the location of the connector). To install the Remote Supervisor Adapter II SlimLine, see “Installing an IBM® Remote Supervisor Adapter II SlimLine” on page 22.
- The server uses a rotational interrupt technique to configure PCI Express adapters so that you can install PCI Express adapters that do not support sharing of interrupts.



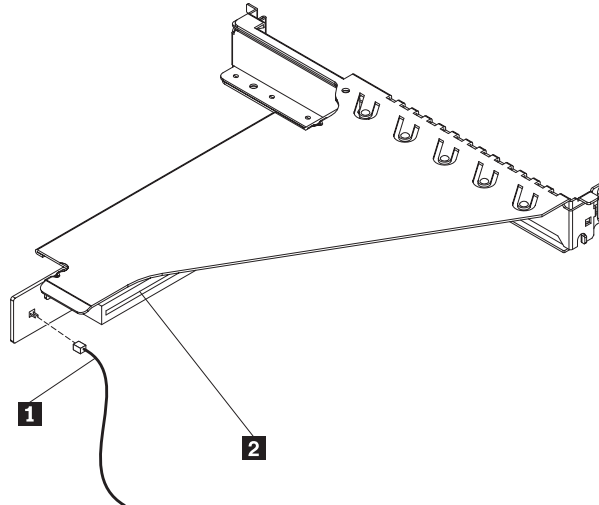
- An optional ServeRAID™-MR10i controller provides RAID level-5 support to the 2.5-inch hot-swap drives and supports an external storage enclosure. A ServeRAID-MR10i controller supports the 2.5-inch hard disk drives without modification.
- An optional SAS HBA Controller adapter enables you to connect external storage devices, such as SAS or SATA hard disk drives or tape drives, to a simple-swap SATA model server.
- The server scans the PCI slots to assign system resources. The scan sequence is related to the startup sequence. If you have not changed the default startup sequence, the server scans the PCI slots in the following order: the integrated Ethernet controllers 1 and 2; then, the drives that are connected to the SAS/SATA controller; then, PCI Express slots 1 and 2.



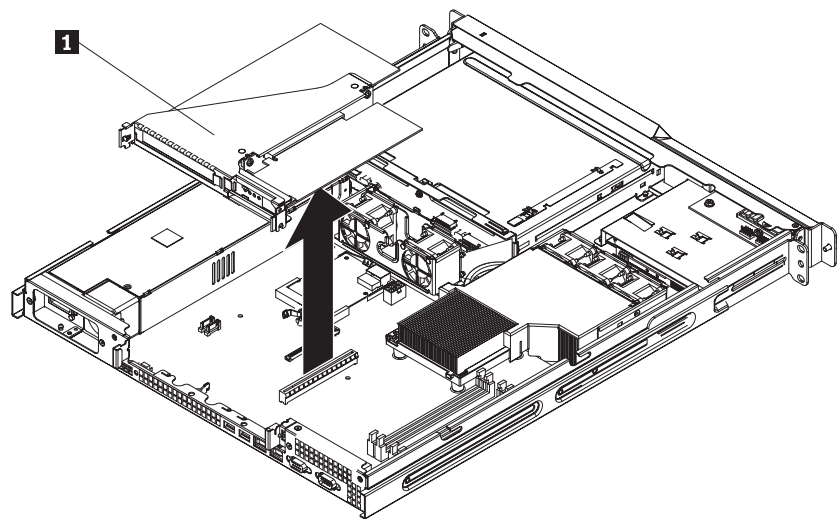
- |          |                         |          |                     |
|----------|-------------------------|----------|---------------------|
| <b>1</b> | Expansion-slot cover    | <b>4</b> | Expansion slot      |
| <b>2</b> | Adapter                 | <b>5</b> | Riser-card assembly |
| <b>3</b> | Adapter support bracket | <b>6</b> | Expansion slot 2    |

To install an adapter, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 11.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables. Remove the cover.



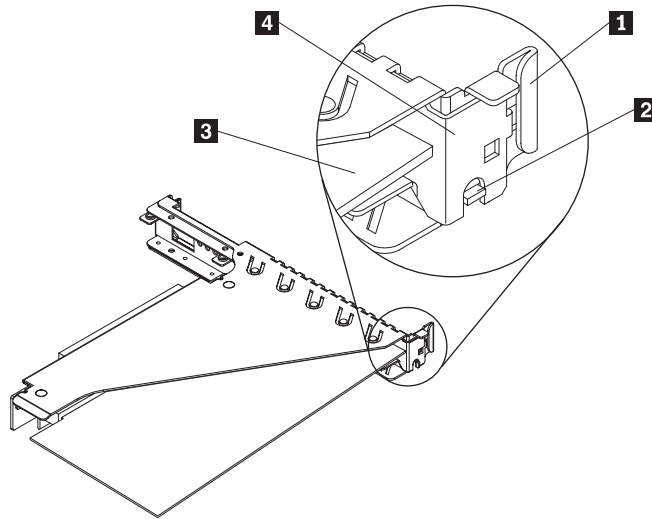
3. If you have installed an optional PCI-X riser-card assembly, disconnect the riser-card power cable **1** from the riser-card assembly.
4. Grasp the riser card at the front and rear edges and lift to remove the riser-card assembly **1**. Place the riser-card assembly on a flat, static-protective surface.



5. Remove the expansion-slot cover on the slot that you intend to use.  
**Attention:** PCI expansion-slot covers must be installed on all vacant slots. This maintains the electronic emissions characteristics of the server and ensures proper cooling of server components.
6. Follow the instructions that come with the adapter to set any jumpers or switches.

**Attention:** When you install an adapter, make sure that it is completely and correctly seated in the expansion slot in the riser card. Incomplete insertion might cause damage to the riser card, system board, or the adapter when you turn on the server.

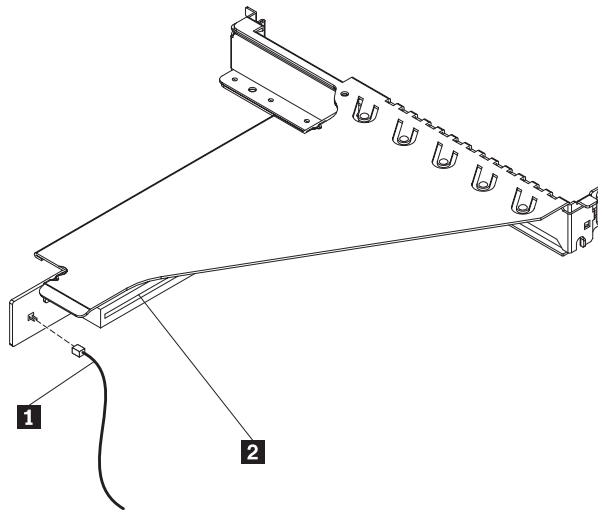
7. Carefully grasp the adapter by its top edge or upper corners and align it with the expansion slot in the riser card assembly; then, press the adapter *firmly* into the expansion slot.



- |          |                        |          |         |
|----------|------------------------|----------|---------|
| <b>1</b> | Adapter bracket        | <b>3</b> | Tab     |
| <b>2</b> | Expansion-slot bracket | <b>4</b> | Adapter |

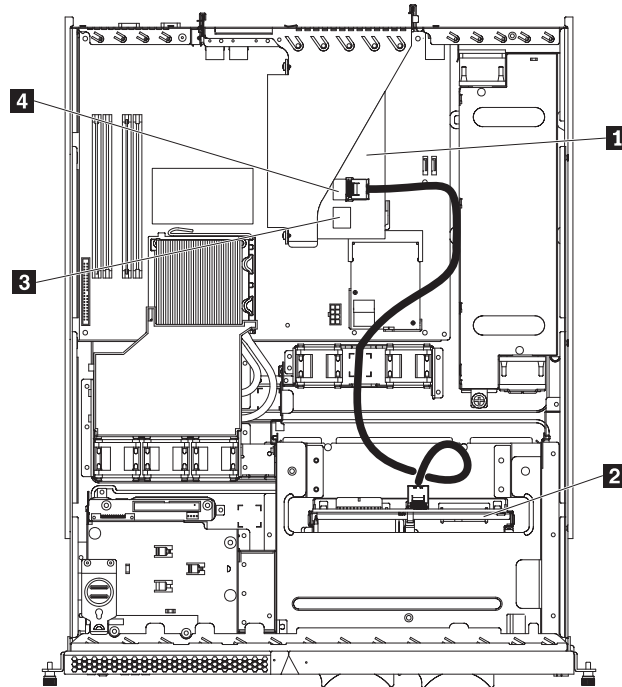
**Important:** Make sure that the U-shaped opening in the metal adapter bracket engages the tab on the expansion-slot bracket.

8. Follow the cabling instructions, if any, that come with the adapter.
9. Reinstall the riser-card assembly. Make sure that the riser-card assembly is fully seated in the riser-card connectors on the system board.



10. If you have installed an optional PCI-X riser-card assembly in the server, reconnect the riser-card power cable **1** to the riser-card assembly.
11. If you are installing a ServeRAID-MR10i controller (2.5-inch drive models only), complete the following steps:

- a. Disconnect the existing SAS/SATA controller signal cable from the hard disk drive backplane and from the controller; then, remove the cable from the server.
- b. Route the ServeRAID-MR10i signal cable as shown in the following illustration and connect it to the hard disk drive backplane.



- |          |                           |          |    |
|----------|---------------------------|----------|----|
| <b>1</b> | ServeRAID controller J8   | <b>3</b> | J9 |
| <b>2</b> | Hard disc drive backplane | <b>4</b> | J8 |

If you have other devices to install, do so now. Otherwise, go to “Completing the installation” on page 24.

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## Installing an IBM® Remote Supervisor Adapter II SlimLine

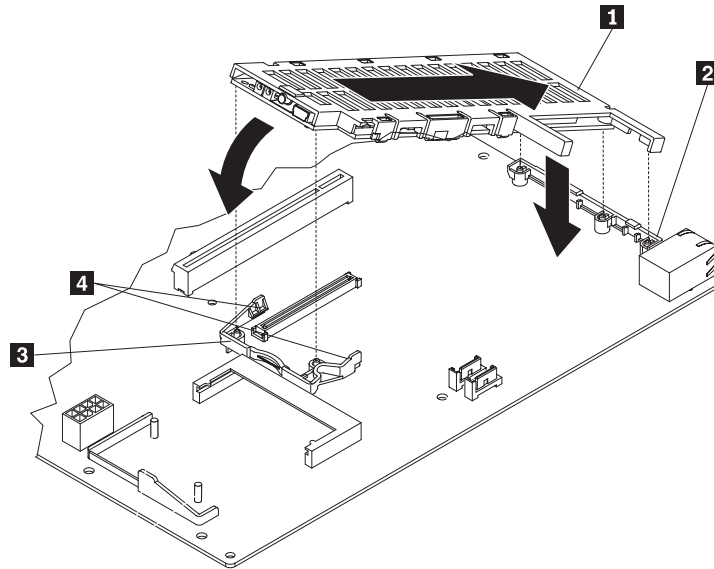
Install an optional Remote Supervisor Adapter II SlimLine in the Remote Supervisor Adapter II SlimLine connector on the system board. See the illustration in “System-board optional-device connectors” on page 9 for the location of the connector. After the Remote Supervisor Adapter II SlimLine is installed, the systems-management port on the rear of the server is active.

**Important:** When the optional Remote Supervisor Adapter II SlimLine is installed in the server, you can install only a half-length adapter in expansion slot 1.

**Notes:**

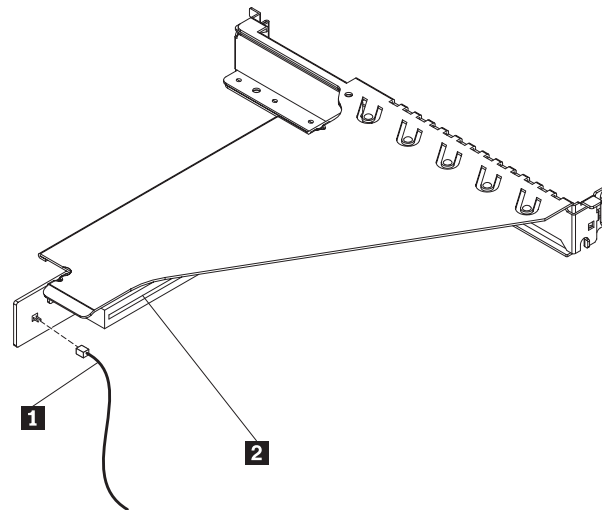
1. When you start the server for the first time after you install a Remote Supervisor Adapter II SlimLine, the startup process will take several minutes longer than a typical startup.
2. Earlier versions of the Remote Supervisor Adapter II SlimLine might not work in this server. See [www.lenovo.com/accessories](http://www.lenovo.com/accessories) for information about the supported Remote Supervisor Adapter II SlimLine versions.

To install a Remote Supervisor Adapter II SlimLine, complete the following steps.



- |          |                                       |          |                                  |
|----------|---------------------------------------|----------|----------------------------------|
| <b>1</b> | Remote Supervisor Adapter II SlimLine | <b>3</b> | Mounting bracket                 |
| <b>2</b> | Mounting bracket                      | <b>4</b> | Mounting bracket retention latch |

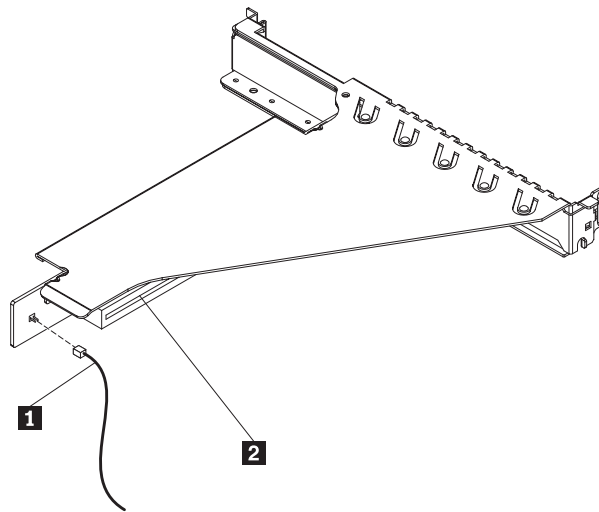
1. Read the safety information that begins on page v and “Installation guidelines” on page 11.
2. Turn off the server and peripheral devices, and disconnect the power cord and all external cables. Remove the cover.



3. If you have installed an optional PCI-X riser-card assembly, disconnect the riser-card power cable **1** from the riser-card assembly.
4. Grasp the riser-card assembly at the front and rear edges and lift to remove it from the server. Place the riser-card assembly on a flat, static-protective surface.
5. Put the protective plastic cover that came with the adapter on the Remote Supervisor Adapter II SlimLine.
6. Turn the Remote Supervisor Adapter II SlimLine so that the keys on the connector align correctly with the connector on the system board.

7. At a downward angle, insert the free end of the adapter under the tab on the mounting bracket, aligning the holes in the adapter with the posts on the mounting bracket. Rotate the rear of the adapter into the rear mounting bracket, aligning the holes in the adapter with the posts on the rear mounting bracket.
8. Press the Remote Supervisor Adapter II SlimLine firmly into the connector and make sure that all tabs on both mounting brackets secure the adapter in place.
 

**Attention:** Incomplete insertion might cause damage to the server or the adapter.
9. If a three-quarter-length adapter is installed in expansion slot 1 on the riser-card assembly, remove it. You can replace it with a half-length adapter if you choose to do so.
10. Reinstall the riser-card assembly. Make sure that the riser-card assembly is fully seated in the riser-card connectors on the system board.



11. If you have installed an optional PCI-X riser-card assembly, reconnect the riser-card power cable **1** to the riser-card assembly.

See the documentation that comes with the Remote Supervisor Adapter II SlimLine for information about installing the firmware and configuring the adapter. Create a backup copy of the configuration so that if you have to replace the adapter in the future you can restore the configuration.

If you have other devices to install, do so now. Otherwise, go to “Completing the installation.”

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## Completing the installation

To complete the installation, complete the following steps:

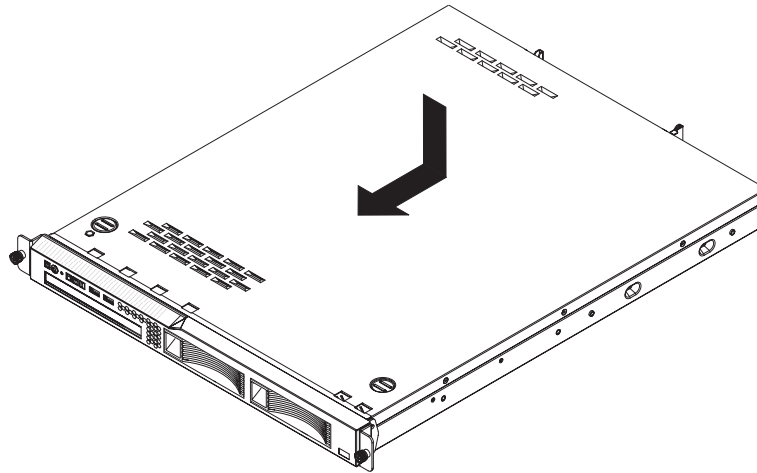
1. Install the cover. See “Installing the cover” on page 25 for more information.
2. Install the server in the rack cabinet. See the *Rack Installation Instructions* that come with the server for detailed information about how to install the server in a rack cabinet.

**Attention:**

- Install the server only in a rack cabinet that has perforated doors.
  - Do not leave open space above or below an installed server in your rack cabinet. To help prevent damage to server components, always install a filler panel to cover the open space and to help ensure proper air circulation. See the documentation that comes with the rack cabinet for more information.
3. Connect the cables and power cords. See “Connecting the cables” on page 25 for more information.
  4. Update the server configuration. See “Updating the server configuration” on page 26 for more information.

## Installing the cover

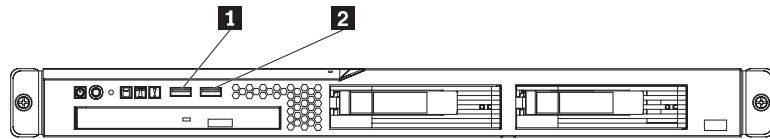
To install the cover, place it into position and slide it forward.



## Connecting the cables

The following illustrations show the locations of the input and output connectors on the front and rear of the server.

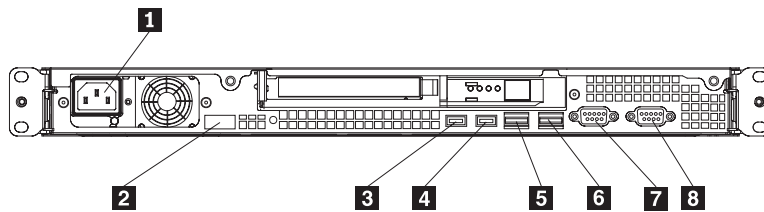
### Front



**1** USB 1 connector

**2** USB 2 connector

## Rear



## You

<b>1</b>	Power-cord connector	<b>5</b>	Ethernet 1 connector
<b>2</b>	Systems-management connector	<b>6</b>	Ethernet 2 connector
<b>3</b>	USB 3 connector	<b>7</b>	Video connector
<b>4</b>	USB 4 connector	<b>8</b>	Serial connector

must turn off the server before you connect or disconnect cables.

See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.

Cable identifiers are printed on the cables that come with the server and devices. Use these identifiers to connect the cables to the correct connectors.

If the server comes with an installed operating system, see the documentation that comes with the operating system for additional cabling instructions.

There is no keyboard connector or mouse connector on the server. You can connect a USB keyboard and USB mouse to the server by using the USB connectors.

## Updating the server configuration

When you start the server for the first time after you add or remove an internal optional device or external SAS device, you might receive a message that the configuration has changed. The Configuration/Setup Utility program starts automatically so that you can save the new configuration settings. For more information, see Chapter 4, “Configuring the server,” on page 31.

Some optional devices have device drivers that you must install. For information about installing device drivers, see the documentation that comes with each device.

If the server has a RAID configuration that uses the SAS/SATA controller with integrated RAID and you have installed or removed a hard disk drive, you might have to reconfigure the disk arrays.

If the server has an optional RAID adapter and you have installed or removed a hard disk drive, see the documentation that comes with the RAID adapter for information about reconfiguring the disk arrays.

For information about configuring the integrated Gigabit Ethernet controllers, see the *User's Guide*.

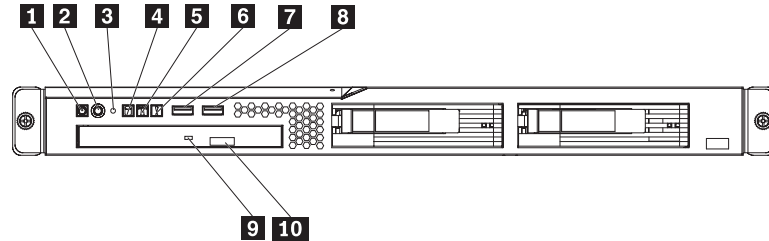


## Chapter 3. Server controls, LEDs, and power

This chapter describes the controls and light-emitting diodes (LEDs) and how to turn the server on and off.

### Front view

The following illustration shows the controls, light-emitting diodes (LEDs), and connectors on the front of the server.



- |          |                              |           |                       |
|----------|------------------------------|-----------|-----------------------|
| <b>1</b> | Power-on LED                 | <b>6</b>  | System Error LED      |
| <b>2</b> | Power-control button         | <b>7</b>  | USB 1 connector       |
| <b>3</b> | Reset button                 | <b>8</b>  | USB 2 connector       |
| <b>4</b> | Hard-disk-drive activity LED | <b>9</b>  | CD drive activity LED |
| <b>5</b> | Locator LED                  | <b>10</b> | CD-eject button       |

**Power-on LED:** When this LED is lit and not flashing, it indicates that the server is turned on. When this LED is flashing, it indicates that the server is turned off and still connected to an ac power source. When this LED is off, it indicates that ac power is not present, or the power supply or the LED itself has failed.

**Note:** If this LED is off, it does not mean that there is no electrical power in the server. The LED might be burned out. To remove all electrical power from the server, you must disconnect the power cord from the electrical outlet.

**Power-control button:** Press this button to turn the server on and off manually. A power-control-button shield comes installed around the button to prevent the server from being turned off accidentally. You can remove this disk-shaped shield if you prefer.

**Reset button:** Press this button to reset the server and run the power-on self-test (POST). You might have to use a pen or the end of a straightened paper clip to press the button.

**Hard disk drive activity LED:** When this LED is flashing, it indicates that a hard disk drive is in use.

**Locator LED:** This LED can be lit remotely by the system administrator to aid in visually locating the server.

**System-error LED:** When this LED is lit, it indicates that a system error has occurred. An LED on the system board might also be lit to help isolate the error. See Chapter 5, “Solving problems,” on page 37 for additional information.

**USB connectors:** Connect a USB device to either of these connectors.

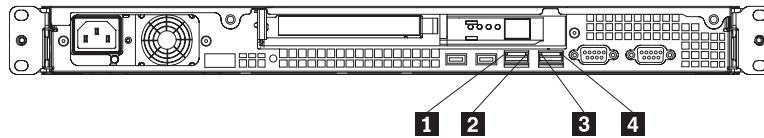
**CD-eject button:** Press this button to release a CD from the CD drive.

**CD drive activity LED:** When this LED is lit, it indicates that the CD drive is in use.

---

## Rear view

The following illustration shows the LEDs on the rear of the server.



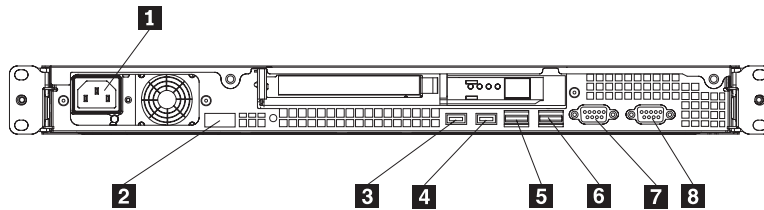
**1** Ethernet 1 activity LED  
**2** Ethernet 1 link LED

**3** Ethernet 2 activity LED  
**4** Ethernet 2 link LED

**Ethernet activity LED:** This LED is on each Ethernet connector. When this LED is lit, it indicates that there is activity between the server and the network.

**Ethernet link LED:** This LED is on each Ethernet connector. When this LED is lit, it indicates that the Ethernet controller is connected to the network.

The following illustration shows the connectors on the rear of the server.



**1** Power-cord connector  
**2** Systems-management connector  
**3** USB 3 connector  
**4** USB 4 connector

**5** Ethernet 1 connector  
**6** Ethernet 2 connector  
**7** Video connector  
**8** Serial connector

**Power-cord connector:** Connect the power cord to this connector.

**Serial connector:** Connect a 9-pin serial device to this connector.

**Video connector:** Connect a monitor to this connector.

**Ethernet connector:** Use either of these connectors to connect the server to a network. Ethernet connector 1 supports Serial over LAN (SOL).

**USB connector:** Connect a USB device to either of these connectors.

**Systems-management connector:** Connect the server to a network for systems-management information control. This connector is active only if you have installed a Remote Supervisor Adapter II SlimLine, and it is used only by the Remote Supervisor Adapter II SlimLine.

---

## Server power features

When the server is connected to an ac power source but is not turned on, the operating system does not run, and all core logic except for the service processor is shut down; however, the server can respond to requests from the service processor (the baseboard management controller), such as a remote request to turn on the server.

### Turning on the server

Approximately 20 seconds after the server is connected to ac power, the power-control button becomes active, and one or more fans might start running to provide cooling while the server is connected to power. You can turn on the server and start the operating system by pressing the power-control button.

The server can also be turned on in any of the following ways:

- If a power failure occurs while the server is turned on, the server will restart automatically when power is restored.
- If your operating system supports the systems-management software for an optional Remote Supervisor Adapter II SlimLine, the systems-management software can turn on the server.
- If your operating system supports the Wake on LAN feature, the Wake on LAN feature can turn on the server.

**Note:** When 4 GB or more of memory (physical or logical) is installed, some memory is reserved for various system resources and is unavailable to the operating system. The amount of memory that is reserved for system resources depends on the operating system, the configuration of the server, and the configured PCI optional devices.

### Turning off the server

When you turn off the server and leave it connected to ac power, the server can respond to requests from the service processor, such as a remote request to turn on the server. While the server remains connected to ac power, one or more fans might continue to run. To remove all power from the server, you must disconnect it from the power source.

Some operating systems require an orderly shutdown before you turn off the server. See your operating-system documentation for information about shutting down the operating system.

**Statement 5:**



**CAUTION:**

The power control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



The server can be turned off in any of the following ways:

- You can turn off the server from the operating system, if your operating system supports this feature. After an orderly shutdown of the operating system, the server will be turned off automatically.
- You can press the power-control button to start an orderly shutdown of the operating system and turn off the server, if your operating system supports this feature.
- If the operating system stops functioning, you can press and hold the power-control button for more than 4 seconds to turn off the server.
- If an optional Remote Supervisor Adapter II SlimLine is installed in the server, the server can be turned off from the Remote Supervisor Adapter II SlimLine user interface.
- The integrated systems-management processor (mini-BMC) can turn off the server as an automatic response to a critical system failure.
- You can turn off the server through a request from the service processor.

## Chapter 4. Configuring the server

Lenovo provides a number of programs to assist you with getting your server up and running quickly.

- ThinkServer EasyStartup program  
This program simplifies the process of installing the operating system and devices drivers. It is on the ThinkServer *EasyStartup* DVD provided with your server. For details, see “Using the ThinkServer EasyStartup program” on page 32.
- Configuration/Setup Utility program  
This program enables you to configure hardware settings and preferences in the BIOS. For details, see “Using the Configuration/Setup Utility program” on page 34
- RAID configuration programs
  - Adaptec RAID (HOSTRAID) Configuration Utility program:  
This program is part of the BIOS code on models that have an integrated ServeRAID-8e (Adaptec HostRAID) controller.
  - LSI Configuration Utility  
This program is part of the BIOS code on models with an optional LSI storage controller with RAID capability.
- Broadcom Gigabit Ethernet Utility program:  
Use this program to configure the network as a startable (bootable) device or specify where the network startup option is displayed in the startup sequence. For additional information, see “Enabling the Broadcom Gigabit Ethernet Utility program” on page “Configuring the Gigabit Ethernet controllers” on page 35.
- Baseboard management controller SMBridge management utility program:  
Use these programs to configure the baseboard management controller, download firmware updates, download SDR/FRU updates, and remotely manage a network.
- ThinkServer EasyManage products  
ThinkServer EasyManage Core Server and ThinkServer EasyManage Remote Client work together to provide centralized hardware and software inventory management and secure automated system management through a single console. See “Using ThinkServer EasyManage products” on page 33.

The following table lists the different server configurations and the applications that are available for configuring and managing RAID arrays.

*Table 3. Configuration and management applications for RAID arrays*

<b>Server configuration</b>	<b>RAID array configuration (before operating system is installed)</b>	<b>RAID array management (after operating system is installed)</b>
Integrated SATA and no SAS controller card installed	None	None
SAS/SATA controller card (LSI 1064) installed	LSI Logic Configuration Utility (Ctrl+C during server startup), ServerGuide	MegaRAID Storage Manager

Table 3. Configuration and management applications for RAID arrays (continued)

Server configuration	RAID array configuration (before operating system is installed)	RAID array management (after operating system is installed)
ServeRAID-MR10i adapter installed (2.5-inch drive models only)	WebBIOS Configuration Utility (Ctrl+H during server startup), BIOS Configuration/Setup Utility program (Ctrl+A during server startup), ServerGuide	WebBIOS Configuration Utility (Ctrl+H during server startup), MegaCLI (command-line interface)

For more information about these programs, see “Configuring the server” in the *User Guide* on the *ThinkServer Documentation DVD*.

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## Using the ThinkServer EasyStartup program

The ThinkServer EasyStartup program simplifies the process of installing the operating system and device drivers by performing the following tasks:

- Detects installed hardware devices
- Guides you through the process of creating a response file
- Prepares the hard disk for installation
- Prompts you to insert the operating-system installation disc
- Initiates an unattended installation of the operating system and device drivers for most adapters and devices

The program is contained on the ThinkServer EasyUpdate disc provided with your server. If you did not receive an *EasyStartup DVD* with your server, you can download an ISO image of the DVD from <http://www.lenovo.com/support>. The program has a built-in help system and User Guide to answer any questions you might have. The program also provides compatibility notes to help you determine what server configurations and operating systems are supported by that specific version of the program.

The ThinkServer EasyStartup program also enables you to save the response file on a USB device or diskette for reuse, and an option that enables you to install an operating system using the saved response. This option is useful if you intend to install the same operating system on similarly configured ThinkServer servers.

### Notes:

1. If you intend to implement a RAID, make sure your storage controller or RAID adapter is configured correctly before you use the ThinkServer EasyStartup program to install the operating system.
2. If you are using any external storage devices or fiber channels, use the utilities provided with the device. You also will have to provide the device drivers for these devices and install them after the EasyStartup program finishes installing the operating system.
3. The *EasyStartup DVD* requires that you have a DVD drive that is configured as your first device in the startup sequence. Use the Configuration/Setup Utility program to view or change your startup sequence. See “Using the Configuration/Setup Utility program” on page 34.
4. To install an operating system, you need the operating system installation disc (CD or DVD) and the associated product key, if one was provided.

To start the *EasyStartup* DVD, do the following:

1. Insert the *EasyStartup* DVD and restart the server. If the EasyStartup program does not start, see “EasyStartup problems” on page 54.
2. Follow the instructions on the screen and continue to the main interface.
3. When you arrive at the Home screen, do any of the following:
  - Click Compatibility notes to view detailed information about the operating systems and server configurations supported by that version of the EasyStartup program.
  - Click User Guide to view an overview of the various functions provided by that version of the EasyStartup program.
  - Click Hardware list to view a list of hardware detected by the ThinkServer EasyStartup program.
  - Click Install operating system to begin the process of creating a response file and installing the operating system. As part of this procedure you will be given the opportunity to include the ThinkServer EasyUpdate program and the ThinkServer EasyManage products (ThinkServer EasyManage Core Server or ThinkVantage EasyManage Remote Client) as part of the installation process. You also can provide one or more command-line based instructions to be run at the end of the operating system installation process. Click About to view version information and legal notices.

To use the *EasyStartup* DVD to install an operation system using a preexisting response file, do the following:

1. Insert the *EasyStartup* DVD and restart the server. If the EasyStartup program does not start, see “EasyStartup problems” on page 54.
2. Follow the instructions on the screen until you get to the Start option screen.
3. When the Start option screen is displayed, do the following:
  - a. Insert the USB device or diskette that contains the response file.
  - b. Select Install the operating system using a preexisting response file.
  - c. Click OK.
4. Follow the remaining instructions on the screen to complete the procedure.

## Using ThinkServer EasyManage products

ThinkServer EasyManage Core Server provides centralized hardware and software inventory management and secure automated system management through a single console. The ThinkServer EasyManage Agent enables other computers and servers to be managed by the centralized console.

You can install the ThinkServer EasyManage Core Server program from the ThinkServer EasyManage CD or you can download and install the program from <http://www.lenovo.com/support>. After one instance of the ThinkServer EasyManage Core Server has been installed, you can use the ThinkServer EasyManage Agent installer to install the agent on other servers and clients on the network.

Also, the EasyServer EasyStartup program provides an option to install these products as part of the operating system installation process.

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## Using the Configuration/Setup Utility program

The Configuration/Setup Utility program is part of the BIOS. You can use it to perform the following tasks:

- View configuration information
- View and change assignments for devices and I/O ports
- Set the date and time
- Set and change passwords
- Set and change the startup characteristics of the server and the order of startup devices (startup-drive sequence)
- Set and change settings for advanced hardware features
- View and clear the event and error logs
- Change interrupt request (IRQ) settings
- Resolve configuration conflicts

To start the Configuration/Setup Utility program, complete the following steps:

1. Turn on the server.
2. When the message Press F1 for Configuration/Setup is displayed, press F1. If an administrator password has been set, you must type the administrator password to access the full Configuration/Setup Utility menu.
3. Follow the instructions on the screen.

See the *User's Guide* that is on the *ThinkServer Documentation* DVD for more information about using the Configuration/Setup Utility program.

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## Using the LSI Logic Configuration Utility program

Use the LSI Logic Configuration Utility program to configure hot-swap hard disk drives that are connected to the SAS/SATA controller.

### Important:

- If the server is a simple-swap SATA model that contains a SATA RAID back plate, you can use the LSI Logic Configuration Utility program to configure the simple-swap SATA hard disk drives.
- If you install an optional RAID controller in the server, such as the ServeRAID-MR10i controller, use the configuration software that comes with the adapter to configure the hard disk drives.

To start the LSI Logic Configuration Utility program, complete the following steps:

1. Turn on the server.
2. When the prompt Press CTRL-C to start LSI Logic Configuration Utility... is displayed, press Ctrl+C. If you have set an administrator password, you are prompted to type the password.
3. Use the arrow keys to select the adapter (SAS controller) for which you want to change settings. Use the Help function to see instructions and available actions for this screen. If you select **SAS Topology** or **Advanced Adapter Properties**, additional screens are displayed.
4. To change the settings of the selected items, follow the instructions on the screen.
5. Press Enter to save your changes.



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## Using the baseboard management controller

The baseboard management controller provides basic environmental monitoring functions for the server. If an environmental condition exceeds a threshold or if a system component fails, the baseboard management controller lights LEDs to help you diagnose the problem and also records the error in the BMC system event log.

The baseboard management controller also provides command-line interface remote server management capabilities through the Avocent SMBridge management utility program. The command-line interface provides direct access to server management functions through the Intelligent Platform Management Interface (IPMI) protocol. Use the command-line interface to issue commands to control the server power, view system information, and identify the server. You can also save one or more commands as a text file and run the file as a script.

---

## Configuring the Gigabit Ethernet controllers

The Ethernet controllers are integrated on the system board. They provide an interface for connecting to a 10 Mbps, 100 Mbps, or 1 Gbps network and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the network. If the Ethernet ports in the server support auto-negotiation, the controllers detect the data-transfer rate (10BASE-T, 100BASE-TX, or 1000BASE-T) and duplex mode (full-duplex or half-duplex) of the network and automatically operate at that rate and mode.

**Note:** The Ethernet controller for Ethernet connector 1 supports Serial over LAN (SOL).

You do not have to set any jumpers or configure the controllers. However, you must install a device driver to enable the operating system to address the controllers. For device drivers and information about configuring the Ethernet controllers, see the *Broadcom NetXtreme II Gigabit Ethernet Software* CD that comes with the server. To find updated information about configuring the controllers, complete the following steps.

**Note:** Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers** from the **Select your product** list.
3. Select **Servers** from the **Brand** list.
4. From **Family** list, select **ThinkServer RS110**, and click **Continue**.



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## Chapter 5. Solving problems

This chapter provides basic troubleshooting information to help you solve some common problems that might occur while you are setting up the server.

If you cannot locate and correct a problem by using the information in this chapter, see Appendix A, “Getting help and technical assistance,” on page 57, the *Hardware Maintenance Manual* on the *ThinkServer Documentation DVD*.

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### Diagnostic tools overview

The following tools are available to help you diagnose and solve hardware-related problems:

- **POST beep codes**

The power-on self-test beep codes indicate the detection of a problem.

- One beep indicates successful completion of POST, with no errors.
- More than one beep indicates that POST detected a problem. Error messages also appear during startup if POST detects a hardware-configuration problem. See “POST beep codes” and the *Hardware Maintenance Manual* on the *ThinkServer Documentation DVD* for more information.

- **Troubleshooting charts**

These charts list problem symptoms and actions to correct the problems. See “Troubleshooting tables” on page 45 for more information.

---

### POST beep codes

POST emits one beep to signal successful completion. If POST detects a problem during startup, other beep codes might occur. Use the following beep code descriptions to help diagnose and solve problems that are detected during startup.

**Note:** See the *Hardware Maintenance Manual* on the *ThinkServer Documentation DVD* for more information about the POST beep codes.

**One beep**

POST was completed successfully without detecting any errors.

**Other beep codes**

See the *Hardware Maintenance Manual* on the *ThinkServer Documentation DVD* for information about other beep codes.

## POST error codes

The following table provides an abbreviated list of the error codes that might appear during POST. See the *Hardware Maintenance Manual* on the *ThinkServer Documentation* DVD for more information about the POST error codes. To check for updated technical information, complete the following steps.

**Note:** Changes are made periodically to the Lenovo Web site. The actual procedure might vary slightly from what is described in this document.

1. Go to: <http://www.lenovo.com/support>.
2. Enter your product number (machine type and model number) or select **Servers** from the **Select your product** list.
3. Select **Servers** from the **Brand** list.
4. From **Family** list, select **ThinkServer RS110**, and click **Continue**.
5. Click **User's guides and manuals** for documentation.

Table 4. Abbreviated list of POST error codes

Error code	Description	Action
062	Three consecutive boot failures using the default configuration.	<ol style="list-style-type: none"><li>1. Update the system firmware to the latest level (see the <i>Hardware Maintenance Manual</i> on the <i>ThinkServer Documentation</i> DVD).</li><li>2. (Trained service technician only) Replace the system board.</li></ol>
101	Tick timer internal interrupt failure.	(Trained service technician only) Replace the system board.
102	Internal timer channel 2 test failure.	(Trained service technician only) Replace the system board.
151	Real-time clock error.	<ol style="list-style-type: none"><li>1. Reseat the battery.</li><li>2. Replace the following components one at a time, in the order shown, restarting the server each time:<ol style="list-style-type: none"><li>a. Battery</li><li>b. (Trained service technician only) System board</li></ol></li></ol>

Table 4. Abbreviated list of POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the <b>Action</b> column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
162	Invalid configuration information or CMOS random-access memory (RAM) checksum failure.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, and save the settings.</li> <li>2. Reseat the battery.</li> <li>3. Replace the battery.</li> <li>4. (Trained service technician only) Replace the system board.</li> </ol>
163	The time of day has not been set.	Run the Configuration/Setup Utility program, set the date and time, and save the settings.
164	Memory size has changed.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program; then, exit, saving the configuration settings.</li> <li>2. Reseat the DIMMs.</li> </ol>
184	Power-on password damaged.	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program, select <b>Load Default Settings</b>, and save the settings.</li> <li>2. Reseat the battery.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time:               <ol style="list-style-type: none"> <li>a. Battery</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
187	VPD serial number not set.	<ol style="list-style-type: none"> <li>1. Reseat the optional Remote Supervisor Adapter II SlimLine.</li> <li>2. (Trained service technician only) Replace the system board.</li> </ol>
189	Three attempts were made to access the server with an incorrect password.	Restart the server and enter the administrator password; then, run the Configuration/Setup Utility program and change the power-on password.

Table 4. Abbreviated list of POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
289	A failing DIMM was disabled.	<ol style="list-style-type: none"> <li>1. Make sure that the DIMM is installed correctly (see “Installing a memory module” on page 14).</li> <li>2. Reseat the DIMM.</li> <li>3. Replace the DIMM.</li> </ol>
178x	Fixed disk error. <b>Note:</b> x is the drive that has the error.	<ol style="list-style-type: none"> <li>1. Run the hard disk drive diagnostic tests on drive x (see “Running the diagnostic programs” in the <i>Hardware Maintenance Manual</i> on the <i>ThinkServer Documentation</i> DVD).</li> <li>2. Reseat the following components, depending on the server model:               <ul style="list-style-type: none"> <li>• Hot-swap models: Hard disk drive x</li> <li>• Simple-swap models:                   <ol style="list-style-type: none"> <li>a. Hard disk drive x</li> <li>b. Hard disk drive x cable</li> </ol> </li> </ul> </li> <li>3. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:               <ul style="list-style-type: none"> <li>• Hot-swap models:                   <ol style="list-style-type: none"> <li>a. Hard disk drive x</li> <li>b. Hard disk drive backplane</li> <li>c. (Trained service technician only) System board</li> </ol> </li> <li>• Simple-swap models:                   <ol style="list-style-type: none"> <li>a. Hard disk drive x</li> <li>b. Hard disk drive x cable</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ul> </li> </ol>
180x	A PCI adapter requested a resource that is not available.	Run the Configuration/Setup Utility program and make sure that the resources that are needed by the PCI adapter are available.

Table 4. Abbreviated list of POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
1962	A hard disk drive does not contain a valid boot sector.	<ol style="list-style-type: none"> <li>1. Make sure that a startable operating system is installed.</li> <li>2. Run the hard disk drive diagnostic tests.</li> <li>3. Reseat the following components:               <ol style="list-style-type: none"> <li>a. Hard disk drive</li> <li>b. Hard disk drive backplane cable or back plate cables</li> </ol> </li> <li>4. Replace the following components one at a time, in the order shown, restarting the server each time:               <ol style="list-style-type: none"> <li>a. (Hot-swap models) Hard disk drive cable</li> <li>b. Hard disk drive</li> <li>c. Hard disk drive backplane or back plate</li> <li>d. (Trained service technician only) System board</li> </ol> </li> </ol>
5962	<p>Internal CD/DVD drive configuration changed.</p> <p>An expected CD or DVD drive was not detected.</p>	<ol style="list-style-type: none"> <li>1. Run the Configuration/Setup Utility program and load the default settings (see “Using the Configuration/Setup Utility program” on page 34).</li> <li>2. Reseat the following components:               <ol style="list-style-type: none"> <li>a. DVD drive cable</li> <li>b. DVD drive</li> </ol> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time:               <ol style="list-style-type: none"> <li>a. DVD drive cable</li> <li>b. DVD drive</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>

Table 4. Abbreviated list of POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
00012000	Processor machine check error.	<ol style="list-style-type: none"> <li>1. (Trained service technician only) Reseat the microprocessor.</li> <li>2. Replace the following components one at a time, in the order shown, restarting the server each time:               <ol style="list-style-type: none"> <li>a. (Trained service technician only) Microprocessor</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>
00019701	Microprocessor x is not functioning or failed the built-in self-test.	Make sure that microprocessor x is installed correctly. If the problem remains, call for service.
01298001	No update data for microprocessor 1.	<ol style="list-style-type: none"> <li>1. Update the BIOS code again (see the <i>Hardware Maintenance Manual</i> on the <i>ThinkServer Documentation</i> DVD).</li> <li>2. (Trained service technician only) Reseat the microprocessor.</li> <li>3. (Trained service technician only) Replace the microprocessor.</li> </ol>
01298101	Bad update data for microprocessor 1.	<ol style="list-style-type: none"> <li>1. Update the BIOS code again (see the <i>Hardware Maintenance Manual</i> on the <i>ThinkServer Documentation</i> DVD).</li> <li>2. (Trained service technician only) Reseat the microprocessor.</li> <li>3. (Trained service technician only) Replace the microprocessor.</li> </ol>



Table 4. Abbreviated list of POST error codes (continued)

Error code	Description	Action
I9990301	Hard disk drive boot sector error.	<ul style="list-style-type: none"> <li>1. Reseat the following components, depending on the server model:               <ul style="list-style-type: none"> <li>• Hot-swap models:                   <ul style="list-style-type: none"> <li>a. Hard disk drive</li> <li>b. SAS/SATA controller</li> </ul> </li> <li>• Simple-swap models:                   <ul style="list-style-type: none"> <li>a. Hard disk drive</li> <li>b. Hard disk drive cable</li> </ul> </li> </ul> </li> <li>2. Replace the following components one at a time, depending on the server model, in the order shown, restarting the server each time:               <ul style="list-style-type: none"> <li>• Hot-swap models:                   <ul style="list-style-type: none"> <li>a. Hard disk drive</li> <li>b. Hard disk drive backplane</li> <li>c. SAS/SATA controller</li> <li>d. (Trained service technician only) System board</li> </ul> </li> <li>• Simple-swap models:                   <ul style="list-style-type: none"> <li>a. Hard disk drive</li> <li>b. Hard disk drive cable</li> <li>c. (Trained service technician only) System board</li> </ul> </li> </ul> </li> </ul>

Table 4. Abbreviated list of POST error codes (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>		
Error code	Description	Action
I9990305	An operating system was not found.	<ol style="list-style-type: none"> <li>1. Make sure that a bootable operating system is installed.</li> <li>2. Run the hard disk drive diagnostic tests.</li> <li>3. Reseat the following components:               <ol style="list-style-type: none"> <li>a. Hard disk drive</li> <li>b. CD or DVD drive and cables</li> <li>c. (Trained service technician only) System board</li> </ol> </li> <li>4. Replace the components listed in step 3 one at a time, in the order shown, restarting the server each time.</li> </ol>
I9990650	AC power has been restored.	<ol style="list-style-type: none"> <li>1. Check the power cables.</li> <li>2. Check for interruption of the power supply.</li> </ol>

## Troubleshooting tables

Use the troubleshooting tables to find solutions to problems that have identifiable symptoms. See the *Hardware Maintenance Manual* on the *Lenovo ThinkServer Documentation DVD* for more detailed troubleshooting information. If you cannot find a problem in these tables, run the diagnostic programs (see “Running the diagnostic programs” in the *Hardware Maintenance Manual*).

If you have just added new software or a new optional device and the server is not working, complete the following steps before you use the troubleshooting tables:

1. Check the system-error LED on the operator information panel (see Chapter 3, “Server controls, LEDs, and power,” on page 27).
2. Remove the software or device that you just added.
3. Run the diagnostic tests to determine whether the server is running correctly.
4. Reinstall the new software or new device.

## CD or DVD drive problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The CD or DVD drive is not recognized.	<ol style="list-style-type: none"> <li>1. Make sure that:               <ul style="list-style-type: none"> <li>• All cables and jumpers are installed correctly.</li> <li>• The signal cable and connector are not damaged and the connector pins are not bent.</li> <li>• All damaged parts are repaired or replaced.</li> <li>• The correct device driver is installed for the CD or DVD drive.</li> </ul> </li> <li>2. Run the CD, CD-RW, or DVD drive diagnostic programs.</li> <li>3. Reseat the following components:               <ol style="list-style-type: none"> <li>a. CD or DVD drive</li> <li>b. CD or DVD interface board cable</li> </ol> </li> <li>4. Replace the following components one at a time, in the order shown, restarting the server each time:               <ol style="list-style-type: none"> <li>a. CD or DVD drive</li> <li>b. CD or DVD drive interface board cable</li> <li>c. CD or DVD interface board</li> <li>d. (Trained service technician only) System board</li> </ol> </li> </ol>
A CD or DVD is not working correctly.	<ol style="list-style-type: none"> <li>1. Clean the CD or DVD.</li> <li>2. Run the CD or DVD drive diagnostic programs.</li> <li>3. Reseat the CD or DVD drive.</li> <li>4. Replace the CD or DVD drive.</li> </ol>

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The CD or DVD drive tray is not working.	<ol style="list-style-type: none"> <li>1. Make sure that the server is turned on.</li> <li>2. Insert the end of a straightened paper clip into the manual tray-release opening.</li> <li>3. Reseat the CD or DVD drive.</li> <li>4. Replace the CD or DVD drive.</li> </ol>

## General problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A cover lock is broken, an LED is not working, or a similar problem has occurred.	If the part is a CRU, replace it. If the part is a FRU, the part must be replaced by a trained service technician.

## Hard disk drive problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
Not all drives are recognized by the hard disk drive diagnostic test.	Remove the drive indicated on the diagnostic tests; then, run the hard disk drive diagnostic test again. If the remaining drives are recognized, replace the drive that you removed with a new one.
The server stops responding during the hard disk drive diagnostic test.	Remove the hard disk drive that was being tested when the server stopped responding, and run the diagnostic test again. If the hard disk drive diagnostic test runs successfully, replace the drive that you removed with a new one.
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables; then, run the hard disk drive diagnostic tests again.
A hard disk drive passes the diagnostic test, but the problem remains.	See “Solving undetermined problems” in the <i>Hardware Maintenance Manual</i>

## Intermittent problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
A problem occurs only occasionally and is difficult to diagnose.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• All cables and cords are connected securely to the rear of the server and attached devices.</li> <li>• When the server is turned on, air is flowing from the fan grille. If there is no airflow, the fan is not working. This can cause the server to overheat and shut down.</li> </ul> </li> <li>2. Check the system-error logs (see “Using the Configuration/Setup Utility program” on page 34).</li> </ol>

## USB keyboard, mouse, or pointing-device problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
All or some keys on the keyboard do not work.	<ol style="list-style-type: none"> <li>1. See <a href="http://www.lenovo.com/accessories">http://www.lenovo.com/accessories</a> for keyboard compatibility.</li> <li>2. Make sure that: <ul style="list-style-type: none"> <li>• The keyboard cable is securely connected.</li> <li>• The server and the monitor are turned on.</li> </ul> </li> <li>3. Move the keyboard cable to a different USB connector.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. Keyboard</li> <li>b. (Only if the problem occurred with a front USB connector) Internal cables to the operation information panel</li> <li>c. (Only if the problem occurred with a front USB connector) Operator information panel</li> <li>d. (Trained service technician only) System board</li> </ol> </li> </ol>

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
The USB mouse or USB pointing device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The mouse is compatible with the server. See <a href="http://www.lenovo.com/accessories">http://www.lenovo.com/accessories</a>.</li> <li>• The mouse or pointing-device USB cable is securely connected to the server, and the device drivers are installed correctly.</li> <li>• The server and the monitor are turned on.</li> </ul> </li> <li>2. If a USB hub is in use, disconnect the USB device from the hub and connect it directly to the server.</li> <li>3. Move the mouse or pointing device cable to another USB connector.</li> <li>4. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. Mouse or pointing device</li> <li>b. (Only if the problem occurred with a front USB connector) Internal cables to the operation information panel</li> <li>c. (Only if the problem occurred with a front USB connector) Operator information panel</li> <li>d. (Trained service technician only) System board</li> </ol> </li> </ol>

## Memory problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The amount of system memory that is displayed is less than the amount of installed physical memory.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• No error LEDs are lit on the operator information panel.</li> <li>• The memory modules are seated correctly.</li> <li>• You have installed the correct type of memory (see “Installing a memory module” on page 14).</li> <li>• All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem.</li> </ul> </li> <li>2. Check the system event/error log for error message 289 (see “Using the Configuration/Setup Utility program” on page 34); if a DIMM was disabled by a systems-management interrupt (SMI), replace the DIMM.</li> <li>3. Run memory diagnostics (see “Running the diagnostic programs” in the <i>Hardware Maintenance Manual</i> ).</li> <li>4. Add one pair of DIMMs at a time, making sure that the DIMMs in each pair match.</li> <li>5. Reseat the DIMMs.</li> <li>6. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. DIMMs</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

## Microprocessor problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The server emits a continuous beep during POST, indicating that the microprocessor is not working correctly.	<ol style="list-style-type: none"> <li>1. Correct any errors that are indicated by the LEDs (see “System-board LEDs” in the <i>Hardware Maintenance Manual</i> ).</li> <li>2. Make sure that the server supports the microprocessor.</li> <li>3. (Trained service technician only) Make sure that the microprocessor is seated correctly.</li> <li>4. (Trained service technician only) Replace the microprocessor.</li> </ol>

## Monitor problems

Some monitors have their own self-tests. If you suspect a problem with your monitor, see the documentation that comes with the monitor for instructions for testing and adjusting the monitor.

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
Testing the monitor	<ol style="list-style-type: none"> <li>1. Make sure that the monitor cables are firmly connected.</li> <li>2. Try using a different monitor on the server, or try testing the monitor on a different server.</li> <li>3. Run the diagnostic programs (see the <i>Hardware Maintenance Manual</i> ). If the monitor passes the diagnostic programs, the problem might be a video device driver.</li> <li>4. (Trained service technician only) Replace the system board.</li> </ol>
The screen is blank.	<ol style="list-style-type: none"> <li>1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.</li> <li>2. Make sure that: <ul style="list-style-type: none"> <li>• The server is turned on. If there is no power to the server, see “Power problems” on page 53.</li> <li>• The monitor cables are connected correctly.</li> <li>• The monitor is turned on and the brightness and contrast controls are adjusted correctly.</li> <li>• Only a single beep sounds when the server is turned on.</li> </ul> <p><b>Important:</b> In some memory configurations, the 3-3-3 beep code might sound during POST, followed by a blank monitor screen. If this occurs and the <b>Boot Fail Count</b> option in the <b>Start Options</b> of the Configuration/Setup Utility program is enabled, you must restart the server three times to reset the configuration settings to the default configuration (the memory connector or bank of connectors is enabled).</p> </li> <li>3. Make sure that the correct server is controlling the monitor, if applicable.</li> <li>4. Make sure that damaged BIOS code is not affecting the video; see “Recovering from BIOS update failure” in the <i>Hardware Maintenance Manual</i> .</li> <li>5. See “Solving undetermined problems” in the <i>Hardware Maintenance Manual</i> .</li> </ol>
The monitor works when you turn on the server, but the screen goes blank when you start some application programs.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The application program is not setting a display mode that is higher than the capability of the monitor.</li> <li>• You installed the necessary device drivers for the application.</li> </ul> </li> <li>2. Run video diagnostics (see the <i>Hardware Maintenance Manual</i> ). <ul style="list-style-type: none"> <li>• If the server passes the video diagnostics, the video is good; see “Solving undetermined problems” in the <i>Hardware Maintenance Manual</i> .</li> <li>• (Trained service technician only) If the server fails the video diagnostics, replace the system board.</li> </ul> </li> </ol>



- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
<p>The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.</p>	<ol style="list-style-type: none"> <li>1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescent lights, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor. <b>Attention:</b> Moving a color monitor while it is turned on might cause screen discoloration. Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor. <b>Notes:</b> <ol style="list-style-type: none"> <li>a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).</li> <li>b. Non-Lenovo monitor cables might cause unpredictable problems.</li> </ol> </li> <li>2. Reseat the following components: <ul style="list-style-type: none"> <li>• Monitor cable</li> <li>• Remote Supervisor Adapter II SlimLine (if one is installed)</li> </ul> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. Monitor cable</li> <li>b. Monitor</li> <li>c. Remote Supervisor Adapter II SlimLine (if one is installed)</li> <li>d. (Trained service technician only) System board</li> </ol> </li> </ol>
<p>Wrong characters appear on the screen.</p>	<ol style="list-style-type: none"> <li>1. If the wrong language is displayed, update the BIOS code with the correct language.</li> <li>2. Reseat the monitor cable.</li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. Monitor</li> <li>b. (Trained service technician only) System board</li> </ol> </li> </ol>

## Optional-device problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
An optional device that was just installed does not work.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The device is designed for the server (see <a href="http://www.lenovo.com/accessories/">http://www.lenovo.com/accessories/</a>).</li> <li>• You followed the installation instructions that came with the device and the device is installed correctly.</li> <li>• You have not loosened any other installed devices or cables.</li> <li>• You updated the configuration information in the Configuration/Setup Utility program. Whenever a device is changed, you must update the configuration.</li> </ul> </li> <li>2. Reseat the device that you just installed.</li> <li>3. Replace the device that you just installed.</li> </ol>
An optional device that used to work does not work now.	<ol style="list-style-type: none"> <li>1. Make sure that all of the cable connections for the device are secure.</li> <li>2. If the device comes with test instructions, use those instructions to test the device.</li> <li>3. Reseat the failing device.</li> <li>4. Replace the failing device.</li> </ol>

## Power problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
<p>The power-control button does not work, and the reset button does work (the server does not start).</p> <p><b>Note:</b> The power-control button will not function until 20 seconds after the server has been connected to ac power.</p>	<ol style="list-style-type: none"> <li>1. Make sure that the power-control button is working correctly:               <ol style="list-style-type: none"> <li>a. Disconnect the server power cords.</li> <li>b. Reconnect the power cords.</li> <li>c. Press the power-control button.</li> <li>d. If the server does not start, disconnect the server power cords and reseal the operator information panel cables; then, repeat steps 1b through 1c. If the problem remains, replace the operator information panel.</li> </ol> </li> <li>2. Make sure that:               <ul style="list-style-type: none"> <li>• The ac power cord is correctly connected to the server and to a working electrical outlet.</li> <li>• The server contains the correct type of DIMMs.</li> <li>• The DIMMs are correctly seated.</li> <li>• (Trained service technician only) The microprocessor is correctly installed.</li> </ul> </li> <li>3. If you just installed an optional device, remove it, and restart the server. If the server now starts, you might have installed more devices than the power supply supports.</li> <li>4. Reseat the following components:               <ol style="list-style-type: none"> <li>a. DIMMs</li> <li>b. (Trained service technician only) Power-supply cables to all internal components</li> <li>c. (Trained service technician only) Power connector on the system board</li> </ol> </li> <li>5. Replace the following components one at a time, in the order shown, restarting the server each time:               <ol style="list-style-type: none"> <li>a. DIMMs</li> <li>b. (Trained service technician only) Power supply</li> <li>c. (Trained service technician only) System board</li> </ol> </li> <li>6. See “Solving undetermined problems” in the <i>Hardware Maintenance Manual</i> .</li> </ol>
<p>The server does not turn off.</p>	<ol style="list-style-type: none"> <li>1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:               <ol style="list-style-type: none"> <li>a. Press Ctrl+Alt+Delete.</li> <li>b. Turn off the server by pressing the power-control button for 5 seconds.</li> <li>c. Restart the server.</li> <li>d. If the server fails POST and the power-control button does not work, disconnect the ac power cord for 20 seconds; then, reconnect the ac power cord and restart the server.</li> </ol> </li> <li>2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.</li> </ol>
<p>The server unexpectedly shuts down, and the LEDs on the operator information panel are not lit.</p>	<p>Call for service.</p>

## Serial-device problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The number of serial ports that are identified by the operating system is less than the number of installed serial ports.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• Each port is assigned a unique address in the Configuration/Setup Utility program and none of the serial ports is disabled.</li> <li>• The serial-port adapter (if one is installed) is seated correctly.</li> </ul> </li> <li>2. Reseat the serial port adapter.</li> <li>3. Replace the serial port adapter.</li> </ol>
A serial device does not work.	<ol style="list-style-type: none"> <li>1. Make sure that: <ul style="list-style-type: none"> <li>• The device is compatible with the server.</li> <li>• The serial port is enabled and is assigned a unique address.</li> <li>• The device is connected to the correct connector (see “Rear view” on page 28).</li> </ul> </li> <li>2. Reseat the following components: <ol style="list-style-type: none"> <li>a. Failing serial device</li> <li>b. Serial cable</li> </ol> </li> <li>3. Replace the following components one at a time, in the order shown, restarting the server each time: <ol style="list-style-type: none"> <li>a. Failing serial device</li> <li>b. Serial cable</li> <li>c. (Trained service technician only) System board</li> </ol> </li> </ol>

## EasyStartup problems

Table 5. EasyStartup DVD

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action Column until the problem is resolved.</li> <li>• See the <i>Hardware Maintenance Manual on the Documentation DVD</i> to determine which components are customer replaceable units (CRU's) and which fields are field replacable units (FRU's).</li> <li>• If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The <i>EasyStartup</i> DVD will not start.	<ul style="list-style-type: none"> <li>• Make sure that the server supports the EasyStartup program and has a startable (bootable) CD or DVD drive.</li> <li>• If the startup (boot) sequence settings have been changed, make sure that the CD or DVD drive is first in the startup sequence.</li> <li>• If more than one CD or DVD drive is installed, make sure that only one drive is set as the primary drive. Start the CD from the primary drive.</li> </ul>
The ServeRAID Manager program cannot view all installed drives, or the operating system cannot be installed.	<ul style="list-style-type: none"> <li>• Make sure that the hard disk drive is connected correctly.</li> <li>• Make sure that the SAS hard disk drive cables are securely connected.</li> </ul>

Table 5. EasyStartup DVD (continued)

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action Column until the problem is resolved.</li> <li>• See the <i>Hardware Maintenance Manual</i> on the Documentation DVD to determine which components are customer replaceable units (CRU's) and which fields are field replaceable units (FRU's).</li> <li>• If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
The operating-system installation program continuously loops.	Make more space available on the hard disk.
The EasyStartup program will not start the operating-system media.	Make sure that the operating-system media is supported by the EasyStartup program. See the <i>EasyStartup</i> DVD label for a list of supported operating-system versions.
The operating system cannot be installed; the option is not available.	Make sure that the server supports the operating-system. If it does, either no logical drive is defined (RAID servers), or the EasyStartup program is not installed. Run the EasyStartup program and make sure that setup is complete.

## Software problems

<ul style="list-style-type: none"> <li>• Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.</li> <li>• See the parts listing in the <i>Hardware Maintenance Manual</i> to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).</li> <li>• If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.</li> </ul>	
Symptom	Action
You suspect a software problem.	<ol style="list-style-type: none"> <li>1. To determine whether the problem is caused by the software, make sure that: <ul style="list-style-type: none"> <li>• The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software. If you have just installed an adapter or memory, the server might have a memory-address conflict.</li> <li>• The software is designed to operate on the server.</li> <li>• Other software works on the server.</li> <li>• The software works on another server.</li> </ul> </li> <li>2. If you received any error messages when using the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.</li> <li>3. Contact your place of purchase of the software.</li> </ol>

## Universal Serial Bus (USB) device problems

- Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.
- See the parts listing in the *Hardware Maintenance Manual* to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU).
- If an action step is preceded by “(Trained service technician only),” that step must be performed only by a trained service technician.

Symptom	Action
A USB device does not work.	<ol style="list-style-type: none"><li>1. Make sure that:<ul style="list-style-type: none"><li>• The correct USB device driver is installed.</li><li>• The operating system supports USB devices.</li></ul></li><li>2. Make sure that the USB configuration options are set correctly in the Configuration/Setup Utility program menu (see the <i>User's Guide</i> for more information).</li><li>3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.</li></ol>

## Video problems

See “Monitor problems” on page 50.

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## Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo assist you. This section contains information about where to go for additional information about Lenovo and Lenovo products, what to do if you experience a problem with your system, and whom to call for service, if it is necessary.

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### Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Use the troubleshooting information in your system documentation, and use the diagnostic tools that come with your system. Information about diagnostic tools is in the *Hardware Maintenance Manual* on the *ThinkServer Documentation DVD* that comes with your system.
- Go to the Lenovo support Web site at <http://www.lenovo.com/support> to check for technical information, hints, tips, and new device drivers or to submit a request for information.

You can solve many problems without outside assistance by using the information available on the Lenovo support site or by following the troubleshooting procedures that Lenovo provides in the documentation that is provided with your Lenovo product. The documentation that comes with Lenovo systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

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### Using the documentation

Information about your Lenovo system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. Most of the documentation for your server is on the *ThinkServer Documentation DVD* provided with your server. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. Lenovo maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to <http://www.lenovo.com/support> and follow the instructions.

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## Getting help and information from the World Wide Web

On the World Wide Web, the Lenovo Web site has up-to-date information about Lenovo systems, optional devices, services, and support. For general information about Lenovo products or to purchase Lenovo products, go to <http://www.lenovo.com>. For support on Lenovo products, go to <http://www.lenovo.com/support>.

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## Calling for service

During the warranty period, you can get help and information by telephone through the Customer Support Center.

These services are available during the warranty period:

- **Problem determination** - Trained personnel are available to assist you with determining a hardware problem and deciding what action is necessary to fix the problem.
- **Hardware repair** - If the problem is caused by hardware under warranty, trained service personnel are available to provide the applicable level of service.
- **Engineering Change management** - There might be changes that are required after a product has been sold. Lenovo or your reseller will make selected Engineering Changes (ECs) available that apply to your hardware.

These items are not covered by the warranty:

- Replacement or use of parts not manufactured for or by Lenovo or non-warranted Lenovo parts
- Identification of software problem sources
- Configuration of BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of application programs

Refer to the safety and warranty information that is provided with your computer for a complete explanation of warranty terms. You must retain your proof of purchase to obtain warranty service.

For a list of service and support phone numbers for your country or region, go to <http://www.lenovo.com/support> and click **Support phone list** or refer to the safety and warranty information provided with your computer.

**Note:** Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

If possible, be at your computer when you call. Have the following information available:

- Machine type and model
- Serial numbers of our hardware products
- Description of the problem
- Exact wording of any error messages
- Hardware and software configuration information



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## Using other services

If you travel with a Lenovo notebook computer or relocate your computer to a country where your desktop, notebook, or server machine type is sold, your computer might be eligible for International Warranty Service, which automatically entitles you to obtain warranty service throughout the warranty period. Service will be performed by service providers authorized to perform warranty service.

Service methods and procedures vary by country, and some services might not be available in all countries. International Warranty Service is delivered through the method of service (such as depot, carry-in, or on-site service) that is provided in the servicing country. Service centers in certain countries might not be able to service all models of a particular machine type. In some countries, fees and restrictions might apply at the time of service.

To determine whether your computer is eligible for International Warranty Service and to view a list of the countries where service is available, go to <http://www.lenovo.com/support>, click **Warranty**, and follow the instructions on the screen.

For technical assistance with the installation of, or questions related to, Service Packs for your preinstalled Microsoft Windows product, refer to the Microsoft Product Support Services Web site at <http://www.support.microsoft.com/directory/>, or you can contact the Customer Support Center. Some fees might apply.

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## Purchasing additional services

During and after the warranty period, you can purchase additional services, such as support for hardware, operating systems, and application programs; network setup and configuration; upgraded or extended hardware repair services; and custom installations. Service availability and service name might vary by country or region. For more information about these services, go to the Lenovo Web site at <http://www.lenovo.com/>.

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## Lenovo product service

台灣 <b>Lenovo</b> 產品服務資訊如下： 荷蘭商思惟個人電腦產品股份有限公司台灣分公司 台北市信義區信義路五段七號十九樓之一 服務電話：0800-000-700
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## Appendix B. Notices

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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been

estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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## Important notes

Processor speed indicates the internal clock speed of the microprocessor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Lenovo makes no representation or warranties regarding non-Lenovo products and services, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

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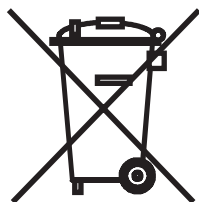
Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

---

## Waste electrical and electronic equipment (WEEE) notices

This unit must be recycled or discarded according to applicable local and national regulations. Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. Information on Lenovo product recycling offerings can be found on Lenovo's Internet site at <http://www.lenovo.com/lenovo/environment>.

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. Lenovo recomienda a los propietarios de equipos de tecnología de la información (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean útiles. Lenovo dispone de una serie de programas y servicios de devolución de productos, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar información sobre las ofertas de reciclado de productos de Lenovo en el sitio web de Lenovo <http://www.lenovo.com/lenovo/environment>.



**Notice:** This mark applies only to countries within the European Union (EU) and Norway.

This appliance is labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

**Remarque :** Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'étiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers

l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local Lenovo representative.

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## Battery return program

This product may contain a lithium or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal or batteries outside the United States, go to <http://www.lenovo.com/lenovo/environment> or contact your local waste disposal facility.

**For Taiwan:** Please recycle batteries.



**For the European Union:**

**Notice:** This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

Les batteries ou emballages pour batteries sont étiquetés conformément aux directives européennes 2006/66/EC, norme relative aux batteries et accumulateurs en usage et aux batteries et accumulateurs usés. Les directives déterminent la marche à suivre en vigueur dans l'Union Européenne pour le retour et le recyclage des batteries et accumulateurs usés. Cette étiquette est appliquée sur diverses batteries pour indiquer que la batterie ne doit pas être mise au rebut mais plutôt récupérée en fin de cycle de vie selon cette norme.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal

concerned in the battery (Pb for lead, Hg for mercury, and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling, and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, go to <http://www.lenovo.com/lenovo/environment>.

**For California:**

Perchlorate material - special handling may apply. See <http://www.dtsc.ca.gov/hazardouswaste/perchlorate/>.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

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## German Ordinance for Work gloss statement

The product is not suitable for use with visual display work place devices according to clause 2 of the German Ordinance for Work with Visual Display Units.

Das Produkt ist nicht für den Einsatz an Bildschirmarbeitsplätzen im Sinne § 2 der Bildschirmarbeitsverordnung geeignet.

---

## Electronic emissions notices

### Federal Communications Commission (FCC) statement

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Lenovo is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### Industry Canada Class A emission compliance statement

This Class A digital apparatus complies with Canadian ICES-003.

## **Avis de conformité à la réglementation d'Industrie Canada**

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

## **Australia and New Zealand Class A statement**

**Attention:** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## **United Kingdom telecommunications safety requirement**

### **Notice to Customers**

This apparatus is approved under approval number NS/G/1234/J/100003 for indirect connection to public telecommunication systems in the United Kingdom.

## **European Union EMC Directive conformance statement**

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Lenovo option cards

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

**Attention:** This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

## **German Class A compliance statement**

### **Deutschsprachiger EU Hinweis:**

### **Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit**

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

### **Deutschland:**



## **Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmitteln**

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher "Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

### **Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.**

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraph 4 Abs. (1) 4:

### **Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**

Nach der EN 55022: "Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: "Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

## **Japanese Voluntary Control Council for Interference (VCCI) statement**

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

## Taiwanese Class A warning statement

警告使用者：  
這是甲類的資訊產品，在  
居住的環境中使用時，可  
能會造成射頻干擾，在這  
種情況下，使用者會被要  
求採取某些適當的對策。

## Chinese Class A warning statement

### 声 明

此为 A 级产品，在生活环境中，  
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在这种情况下，可能需要用户对其  
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또는 사용자는 이점을 주의하시기 바라며, 만약 잘못 판매 또는  
구입하였을 때에는 가정용으로 교환하시기 바랍니다.

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